773a

CHAMBERLAIN's ARITHMETICK:

BEING

A Plain and Easie Explanation of the most Useful and Necessary Art of ARITHMETICK

IN

Whole Numbers and Fractions, that the meanest Capacity may obtain the knowledge thereof in a very short time.

Whereunto are Added

Many RULES and TABLES of Interest, Rebate, Purchases, Gaging of Cask, and Extraction of the Square and Cube Roots.

Composed by

ROBERT CHAMBERLAIN, Accomptant, and Practitioner in the Mathematicks.

LONDON:

Printed for *John Clark* at *Mercers-Chappel* in *Cheapside*, 1679.

30.

Ingenuous Chamberlaine, brave soul, see heere
In his Effigies. Hee makes appeare
That can't withstand his wisdom, paines & skill
Which puzzled Ages past. Numbers now will
Triumph in their fam'd Patron Chamberlaine,
Whose Art' yond All, makes things abstruse most plaine.*

W. Binneman sculp.

777a

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Licensed.

Sept. 16.
1678.

Rog. L'Estrange.

To the Right Honourable

Thomas Lord *Needham*,

Viſcount of *Kilmurray*.

My Lord,

I Having been moſt abundantly obliged to that Honourable, and moſt worthy Lady whoſe Off-ſpring your Lordship is, I was the more induced to attempt the boldneſs of this my humble Dedication of this ſmall Treatiſe of *Arithmetick* to your Lordship, beſeeching you to per-

mit it Shelter under the ſafe Covert of your Protection, at its firſt entrance upon the Stage of the cenſuring World : which if your LORDSHIP ſhall pleaſe to vouchſafe to this ſmall Endeavour of mine, I ſhall ever remain

Your Lordſhips

Devoted Servant

Robert Chamberlain.

To his most Honoured

and much Esteemed Friend

John Shaw, *Esq;*

Most Worthy Sir,

K*Nowing how great a Lover and Admirer you both are and have been of Learning and Arts, from your Minority, and in how great a measure you have tasted of those Springs of Learning, from one of the most famous Fountains of Education in this Land, did induce and embolden me to present you with a small Product of some studious hours, which I have at vacant times employed in the Art or rather Science of* ARITHMETICK, *it being*

Custo-

Cuſtomary to make an Offering of the Firſt-Fruits to the beſt of Friends. So an humble Acknowledgment of thoſe many Favours and Obligations I have received from you and your reſpected Family, I here proſtrate theſe my Firſt-Fruits at your Feet, hoping you will find them both pleaſant and eaſie of Digeſtion, beſeeching your favourable and kind Acceptance, and to vouchſafe it your Protection at its launching forth into the wide Sea of this World, from the Blaſts of Ignorance or Envy, and as in Duty I ſtand obliged to pray for the eternal Happineſs of you and yours, I reſt

Your Faithful Servant

Robert Chamberlain.

TO THE
READER.

ARithmetick being ſo uſeful and neceſſary a Science, that without ſome knowledge thereof men could not negotiate their worldly Affairs in their ſeveral Vocations and Callings, becauſe in our ſeveral Negotiations we do oftentimes make uſe of Mony, Weight and Meaſure, which cannot be learned without the Art of *Arithmetick*.

Having gained a competent meaſure of knowledge in this Art, by my ſtudious Inclinations for many years that way, at the earneſt deſire and requeſt of ſome Friends, I have publiſhed this ſmall Treatiſe of *Arithmetick*, for the good and benefit

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Benefit of ſuch as deſire to attain the knowledge thereof, although their Capacities are ſo mean that they are totally ignorant of any Knowledge therein.

And for the Benefit of ſuch Capacities, it hath been my chief Endeavour to explain and demonſtrate the ſeveral Rules and Branches of *Arithmetick* in a plain and eaſie Method, each Rule and Branch illuſtrated with variety of Examples. Alſo a new and more eaſie way of dividing downward, without cancelling of Figures, being a more pleaſant way to the Learner. Alſo new Tables for Gauging of Ale or Wine Cask, with plain and eaſie Demonſtrations thereof. Alſo plain and eaſie Rules ſhewing how to extract the Square and Cube Roots. And as I have endeavoured to make plain and eaſie

demon-

demonſtrations, ſo I have likewiſe endeavoured to be brief as I could, becauſe I would not have my Treatiſe burthenſome to the Readers memory, hoping the gentle and courteous Reader may find it worth his Peruſal and Acceptance, both to his Pleaſure and Profit, which if he do, I have obtained the end of my Labour and Deſire, and remain for thy further Inſtruction at pleaſure,

Your Loving Friend,

Robert Chamberlain.

From my Houſe in *Northumberland-Ally* in *Fen-Church-Street* near *Aldgate.* *October* 22. 1678.

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Chamberlain's Arithmetick:

CHAP. I.

The Definition of Arithmetick.

ARithmetick is the Art of Numbers which teacheth to put the true value upon any figure or figures, and doth consist of these following Parts, which are as Branches.

1 *Numeration.*
2 *Addition.*
3 *Subtraction.*
4 *Multiplication.*
5 *Division.*

These are the chief general Parts of Arithmetick, and Number is a company of Figures which are composed of many

Units, as two is composed of two Units, Three is composed of three Units, Four, of four Units, *&c.*

Therefore one unite is no number, but the beginning of number, for one doth neither multiply nor divide, for if you multiply or divide an unite by it self, it admitteth of neither increase nor decrease, but number admitteth of both, Increase by Addition or Multiplication, and Decrease by Subtraction or Division, as *6* is a number composed of six units, and admitteth of Increase first by Addition, as 1 unit and *6* make 7, secondly by Multiplication, as 3 times *6* make 18, and *6* admitteth likewise of Decrease, first by Subtraction, as, take 1 from *6* and there remains 5: secondly by Division, as how many 2 can I have in *6*, the answer is 3 times.

Numeration.

NUmeration is that part of Arithmetick, by which is taught rightly and justly to value, declare and write any Number or Sum propounded. All Numbers and Sums are expressed by these following Characters or Figures, which are in

in number ten, whoſe value if you conceive each figure to be or ſtand by it ſelf, you may take notice of by their ſeveral Subſcriptions.

1	2	3	4	5	6	7	8	9	0
one,	*two,*	*three,*	*four,*	*five,*	*ſix,*	*ſeven,*	*eight,*	*nine,*	*cypher.*

Nine of theſe figures, *viz.* 1, 2, 3, 4, 5, 6, 7, 8, 9, are ſignificant figures, ſignifying each figure ſo many Unites, but the Cypher is of no value nor ſignification, as as it ſtandeth alone, but being joine dwith other figures it increaſeth the value of thoſe figures which ſtand to the left hand of him.

Now theſe nine ſignificant figures 1, 2, 3, 4, 5, 6, 7, 8, 9, have a double Value, whereof the one is certain, according to its own ſignification as before. But the other value is uncertain, it being according to the place that the ſaid Figure doth ſtand in and poſſeſs.

A Place is a ſeat or room that a figure ſtands in, and how many figures there are in any ſum, ſo many places of value doth the ſaid ſum contain, and that is the firſt place of any Sum, which is next the right hand, every place being ten times the value of the next right hand place.

Numeration Table.

C. Millions	X. Millions	Millions	C. Thousands	X. Thousands	Thousands	Hundreds	Tens	Units	How each Number is to be read.
								1	One
							1	2	Twelve
						1	2	3	1 hundred twenty three
					1	2	3	4	1 thousand 234
				1	2	3	4	5	12 thousand 345
			1	2	3	4	5	6	123 thous. 456
		1	2	3	4	5	6	7	1 Million 234567
	1	2	3	4	5	6	7	8	12 Mill. 345678
1	2	3	4	5	6	7	8	9	123 Mil. 456789

This

This Table needeth but little explana-ion, for thereby you may diſcern the firſt lace next the right hand to be the place of Units; the ſecond, the place of Tens; the hird, the place of Hundreds; the fourth, Thouſands, *&c.* So admit the ſum 6873 were given you to number, conſiſting of four places, becauſe in it are contained four figures, which you muſt thus number, ſix thouſand eight hundred ſeventy three. And in like manner for 784395, which you muſt thus number, ſeven hundred eighty four thouſand three hundred ninety five.

CHAP. II.

Addition.

ADdition teacheth of ſeveral Sums to make one which ſhall contain as much as all thoſe ſeveral Sums, as ſuppoſe,

A oweth unto——— *B*—328
C—147 *Pounds.*
D—485

Total Sum 960

Set the ſeveral Sums as you ſee one under the other. Having drawn a Line, begin at the lower end of that row next your right hand; ſaying, 5 and 7 is 12, and 8 is 20, ſetting under that firſt row 0, and carry 2 for ſo many tens to the next row; ſaying, 2 as I carried and 8 is 10, and 4 is 14, and 2 is 16, ſetting down 6 under that row, and carry 1 for the 10 to the next row; ſaying, 1 as I carried and 4 makes 5, and 1 is 6 and 3 is 9, ſetting down 9 under that row; ſo you have under the Line theſe figures 960, which is the total Sum of thoſe three. So that A oweth in all to B, C, and D, 960 Pounds.

When you have any Sum to ſet down which you are to add up, you muſt be ſure to ſet down the ſeveral ſums ſo orderly one under the other as the units may ſtand under themſelves, tens under themſelves, hundreds under themſelves, and thouſands under themſelves, *&c.* According to theſe following Examples.

3842 *l.*	863219
428	76824
97	4386
9	327
	24
	6

Ad-

Addition of Mony.

If you have any Sums which are com-posed of several Denominations, as Pounds, Shillings, Pence and Farthings, or any other kind; you must first consider how many of the lesser make one of the next Denomination; as, in Sterling Mony

4	Farthings	is	1	Penny
12	Pence	is	1	Shilling
20	Shilling	is	1	Pound Sterling.

And so carry the Pence from the Farthings to the Pence, the Shillings from the Pence to the Shillings, and the Pounds from the Shillings to the Pounds; as you may plainly see in the working of this following Example.

		l.	*s.*	*d.*	
Received of	A	384	16	11	$\frac{1}{2}$
	B	197	14	08	$\frac{3}{4}$
	C	79	12	03	$\frac{1}{4}$
	D	9	13	10	$\frac{1}{4}$
		671	17	10	$\frac{1}{4}$

Suppose I had received mony of four several persons, *viz.* of A 384 *l.* 16 *s.* 11 *d.* $\frac{1}{2}$, of B 197 *l.* 14 *s.* 08 *d.* $\frac{3}{4}$, of C. 79 *l.* 12 *s.* 03 *d.* $\frac{1}{4}$, and of D I have received 9 *l.* 13 *s.* 10 *d.* $\frac{3}{4}$; and I desire to know how much the four Sums make altogether. Set down the said Sums in such order one under the other, as the farthings may stand under themselves, the pence under themselves, the shillings under themselves, and the pounds under themselves; and in such manner as Units, Tens and Hundreds may stand under one another, according as you see them here set down; then draw a line, and begin at the bottom of the least Denomination; saying, $\frac{3}{4}$ and $\frac{1}{4}$ is four farthings, and $\frac{3}{4}$ is seven farthings, and $\frac{1}{2}$ is nine farthings, or two pence farthing, setting down $\frac{1}{4}$ under the farthings, and carrying 2 to the pence; saying, 2 as I carried and 10 is 12, and 3 is 15, and 8 is 23, and 11 is 34 pence, which is 2 *s.* 10 *d.* therefore set down 10 under the pence, and carry 2 to the shillings; saying, 2 as I carried and 3 makes 5, and 2 is 7, and 4 is 11, and 6 is 17; setting down 7 under the first row of shillings, and car- carrying 1 to the next row of shillings; saying,

ſaying, 1 as I carried and 1 is 2, and 1 is 3 and 1 is 4, and 1 makes 5; which being odd, I ſet 1 after the 7, but under the laſt row of ſhillings: now the half of 5 being 2, I carry 2 unto the pounds; ſaying, 2 as I carried and 9 is 11, and 9 is 20, and 7 is 27, and 4 is 31, ſet down 1 under that row and carry three to the next row; ſaying, 3 as I carried and 7 is 10, and 9 is 19, and 8 is 27: ſetting 7 under this row, and carry 2 to the next; ſaying, 2 as I carried and 1 is 3, and 3 is 6; ſetting down 6 under the laſt row, ſo I find I have received in all of A, B, C, and D 671 *l.* 17 *s.* 10 *d.* $\frac{1}{4}$.

	l.	*s.*	*d.*	
	384	16	11	$\frac{1}{2}$
	197	14	08	$\frac{3}{4}$
	79	12	03	$\frac{1}{4}$
	9	13	10	$\frac{3}{4}$
Total	671	17	10	$\frac{1}{4}$
Proof	287	00	10	$\frac{3}{4}$
	671	17	10	$\frac{1}{4}$

For the Proof of this Sum, whether it be caſt up right or not, the common way is to draw a line under the firſt ſum, and then ſum up again, only leaving out the uppermoſt row, which ſum being added to the uppermoſt row or line, then if the ſum be the ſame as before, the work is right caſt up. But it is as eaſie or better to caſt up the whole ſum again, and if you think by doing ſo, you may commit the ſame error again, or fall into the ſame miſtake as before, you may caſt it up the contrary way, *viz.* begin at top and go downwards, for the Accompt will amount to one and the ſame ſum, if it be right done.

But Tradeſmen and Merchants being moſt concerned herein, have another help, which is in writing out Bills by their Books, if they find the ſums in both Accompts do not agree, they conclude there muſt be a miſtake in one or the other, which they find out by caſting the Accompts over again.

In caſting up long Bills, where many ſhillings, are in the pence, it is a good plain way to make a prick or ſome ſmall mark at every ſhilling, and ſo ſetting down the odd pence at laſt, counting over how many

pricks you have made, and carry so many Shillings to the place of Shillings.

But such as are ready and expert, count how many Pence are in the whole Column, then by getting without Book such a Table as here followeth, can readily tell how many Shillings and odd Pence are in any Number of Pence.

d.		s.
12	are	1
24		2
36		3
48		4
60		5
72		6
84		7
96		8
108		9
120		10
132		11
144		12

d.		s.	d.
20	are	1	08
30		2	06
40		3	04
50		4	02
60		5	00
70		5	10
80		6	08
90		7	06
100		8	04
110		9	02
120		10	00

Addition of Flemish Mony.

Flemish Mony is reckoned by Pounds, Shillings and Pence, as we do our Sterling. But frequently they do reckon by Stivers and Guilders, or Stivers and Ducatoons. 20 Stivers being 1 Guilder, and 63 Stivers is 1 Ducatoon.

Stiv.	*Guild.*	*Stiv.*	*Ducat.*	*Stiv.*
	323	16	321	23
	129	09	78	34
	14	18	69	57
	468	03	469	51

A Table for the Reducing Flemish Ducatoons into Guilders and Stivers.

D.	Guil.	Stiv.	Duc.	Guild.	Stiv.
1	3	3	100	315	00
2	6	6	200	630	00
3	9	9	300	945	00
4	12	12	400	1260	00
5	15	15	500	1575	00
6	18	18	600	1890	00
7	22	1	700	2205	00
8	25	4	800	2520	00
9	28	7	900	2835	00
10	31	10	1000	3150	00
20	63	00	2000	6300	00
30	94	10	3000	9450	00
40	126	00	4000	12600	00
50	157	10	5000	15750	00
60	189	00	6000	18900	00
70	220	10	7000	22050	00
80	252	00	8000	25200	00
90	283	10	9000	28350	00
100	315	00	10000	31500	00

Add

Addition of French Mony.

4 Quarters make 1 Solx, 60 Solx make one French Crown.

Therefore for 4 Quarters carry 1 Solx to the Solxes, for 60 Solxes carry 1 French Crown. As you may plainly ſee in the following Example.

Cr.	*ſolx.*	*qrs.*
248	42	3
476	37	2
124	29	3
297	56	1
1147	46	1

Addition of Haverdupoize *Weight.*

TABLE.

16 Ounces is 1 Pound.
28 Pound is 1 Quarter.
4 Quarters is 1 Hundred weight.
20 Hundred weight is 1 Tun.

Inſtru-

Instructions.

Therefore from your ounces for every 16 carry 1 pound to your pounds, from your pounds for every 28 carry 1 quarter to your quarters, and from your quarters for every 4 carry 1 hundred to your hundreds, and from your hundreds for every 20 carry 1 Tun to your Tuns; as you perceive by the following Example.

Example.

Tuns.	*C.*	*qrs.*	*li.*	*oz.*
27	18	2	24	12
15	16	3	26	14
9	12	1	18	09
7	08	3	12	07
60	16	3	26	10

Addition of Apothecaries Weights.

TABLE.

20 Grains is 1 Scruple ℈.
3 Scruples is 1 Drachm ʒ.
8 Drams is 1 Ounce ℥.
12 Ounces is 1 Pound ℔.

Instru-

Instructions.

From the Grains for every 20 you must carry 1 Scruple to the Scruples, from the Scruples for every 3 carry 1 Drachm to the Drachms, from the Drachms for every 8 carry 1 Ounce to the Ounces, and from the Ounces for every 16 carry 1 Pound to the Pounds; according as you may see done in the following Example.

Example.

℔	℥	ʒ	℈	*gr.*
4	12	6	2	16
3	15	5	1	10
1	10	3	1	15
10	07	0	0	01

Addition of Troy *Weight.*

TABLE.

[illegible] Grains is 1 Penny Weight.
[illegible] Penny Weight is 1 Ounce.
[illegible] Ounces is 1 Pound.

Instru-

Instructions.

For 24 Grains carry 1 Penny Weight to the Penny Weights, for 20 Penny Weights [illegible] carry 1 Ounce to the Ounces, for 12 Ounces carry 1 Pound to the Pounds.

Example.

li.	*oz.*	*p.weig.*	*gr.*
19	08	16	21
14	09	17	17
9	11	18	22
44	06	13	12

Addition of Wine Measure.

TABLE.

2 Pints is 1 Quart.
2 Quarts is 1 Pottle.
2 Pottles is 1 Gallon.
63 Gallons is 1 Hogshead.
4 Hogsheads is 1 Tun.

Instru-

Instructions.

From Pints for every 2 carry 1 Quart to the place of Quarts, from Quarts for every 2 carry 1 Pottle to the place of Pottles, from the place of Pottles for every 2 carry 1 Gallon to the place of Gallons, and from the place of Gallons for every 63 carry 1 Hogshead to the place of Hogsheads, and from the place of Hogsheads for every 4 carry 1 Tun to the place of Tuns; as by the following Example.

Example.

Tuns.	*hogsh.*	*gal.*	*pottl.*	*qrts.*	*pints.*
237	1	38	1	1	1
142	3	47	0	1	1
95	2	54	1	0	1
46	1	29	1	1	0
8	2	12	0	0	1
530	3	56	1	1	0

Addition

Addition of Beer Measure.

TABLE.

2 Pints is 1 Quart.
2 Quarts is 1 Pottle.
2 Pottles is 1 Gallon.
9 Gallons is 1 Firkin.
2 Firkins is 1 Kilderkin.
2 Kilderkins is 1 Barrel.

Example.

Bar.	kild.	firk.	gal.	pottl.	qrts.	pts.
54	1	1	7	1	0	1
32	1	0	6	0	1	0
25	1	1	4	1	1	1
12	1	1	3	0	1	0
9	0	1	5	1	0	1
135	1	1	0	1	0	1

Addition of dry Measure.

TABLE.

16 Pints is 1 Peck.
4 Pecks is 1 Bushel.
8 Bushels is 1 Quarter.
5 Quarters is 1 Wey.
2 Wey 1 Last.

Exam-

Example.

Quar.	bush.	peck.	pin.
128	5	2	11
342	6	3	12
487	7	1	10
83	4	3	15
1043	1	0	00

Addition of long Measure.

TABLE.

3 Barly Corns make 1 Inch.
12 Inches 1 Foot.
3 Foot 1 Yard.
5 Yards ½ 1 Pole or Perch.
40 Perches 1 Furlong.
8 Furlongs 1 English Mile.

By the Table you may easily discern what to carry at in each Denomination, as by the following Example doth appear.

Exam-

Example.

Mil.	Furl.	Poles.	Yards.	Feet.	Inch.	B. Cor.
42	5	32	4	2	11	2
36	3	28	5	2	09	1
18	7	16	0	1	07	2
98	0	38	0	1	04	2

Addition of Cloth Measure.

TABLE.

4 Nails is 1 Quarter.
4 Quarters is 1 Yard.
5 Quarters is 1 Ell English.
3 Quarters is 1 Ell Flemish.

1 Example.			2 Example.			3 Example.		
Yard.	qrs.	nail.	Ell En.	qr.	nail.	Ell Fl.	qr.	na.
41	3	2	36	4	3	50	2	1
39	1	3	28	3	2	37	1	3
26	2	3	24	2	3	32	2	2
24	3	1	21	2	[illegible]	31	0	[illegible]
20	2	3	18	4	2	27	1	[illegible]
18	3	2	16	3	1	24	2	[illegible]
172	1	2	147	[illegible]	0	204	1	[illegible]

Addition of Time.

TABLE.

60 Minutes is 1 hour.
24 Hours is 1 Day.
365 Days is 1 Year.

Example.

Years.	*days.*	*hours.*	*min.*
29	268	21	45
27	172	18	28
21	163	16	24
18	157	12	22
9	126	08	16
106	59	05	15

I suppose I have explained this part of Arithmetick, that any capacity may easily understand how to make use of the said Rule, either in Addition of Mony, Weight, or any sort of Measure, wet or dry, *&c.*

CHAP.

CHAP. III.

Subtraction.

SUbtraction teacheth how to take a less Number out of a greater, and likewise doth shew what remaineth of the greater Number when the lesser Number is taken out.

There be three Numbers in *Subtraction* to be observed. First, the Number from whence the Subtraction is to be made; secondly, the Number that is to be subtracted; thirdly, the number that remaineth after the Subtraction is made. As if I would subtract 24 from 36, 36 is the Number out of which the Subtraction is made, 24 is the Number to be subtracted, and 12 is the Number that remaineth after you have ended your Subtraction.

When you are to subtract, you must first set down the greater Number, or Number from whence the Subtraction is to be made, and under that set down the lesser Number, or Number to be subtracted, in such manner

ther, as one Denomination may ſtand under another, as Farthings under Farthings, Pence under Pence, Shillings under Shillings, and Pounds under Pounds; Units under Units, Tens under Tens, and Hundreds under Hundreds, according to their places, and then draw a right Line under thoſe two Numbers.

Subtraction of one Denomination.

Having placed your Numbers one under the other as was directed, you muſt begin on the right hand, and ſubtract the firſt figure of the undermoſt Number from the firſt figure of the uppermoſt Number over it, and that which remaineth ſet underneath the Line, right under the Figure you have ſubtracted, then take the ſecond Figure of your undermoſt Number, and take it from the ſecond Figure of your uppermoſt Number, the third from the third, and ſo forth until you come to the end, putting always the remainder of every Figure under the Line in its due order and place.

Exam-

Example.

	l.
Owing unto B C——	2784
Paid unto B C——	1552
Rest due——	1232

According to the former Instructions, I do begin at the right hand; saying, 2 from 4 and there remains 2, which I set down under the Line, and right under the first Figure subtracted; then I go to the next Figure, saying, 5 from 8 and there remains 3, which I set under the 5, being the second Figure subtracted; then I go to the next Figure, and say, 5 from 7 and there doth remain 2, which 2 I set down under the third Figure subtracted; then I go to the next and say, 1 from 2 and there doth remain 1, which I set under the last Figure subtracted. So there stands under the Line this Number 1232 *l.* which doth remain due unto B C.

But sometimes it doth fall out to have 2 Figures of one Quantity and Likeness to be subtracted one from another. As, 5

and 5; then I ſay, 5 from 5 and there doth remain 0. And when you have a Cypher to be ſubtracted from any Figure. As 0 and 7; then you muſt ſay, 0 from 7 and there remains 7, and ſo for any Figure.

It will be requiſite to give you one Example more in ſums of one Denomination, wherein the Figures of the leſſer Number or Number to be ſubtracted, are ſome of them greater than the Figures of the greater Number, or Number from whence you muſt ſubtract; In ſuch caſe you muſt borrow 10, and add to the uppermoſt Figure, and then ſubtract your Figure to be ſubtracted from that Sum, and ſet down your remainer; always remembring when you borrow 10, to add 1 to the next Figure to be ſubtracted for paiment, as in this following Example.

Example.

	l.
Due from A B ———	42317
Received ——— ———	32140
Remains due ——— ———	10177

Here

Here is due from A B 42317 Pound, and there is received 32140 Pound, I desire to know what is due from the said A B. Having set the two Sums down according to the former Instructions; saying, 0 from 7 and there remains 7, 4 from 1 I cannot, but 4 from 11 and there remains 7; 1 as I borrowed and 1 is 2, 2 from 3 and there remains 1; 2 from 2 and there remains 0, and 3 from 4 and there remains 1. So there doth remain due from A B 10177 Pound. And in like manner for any other Sum, wherein you have one or more Figures of the lower Number greater than the Figures under which they do stand to be subtracted.

Subtraction of Mony.

In Sums composed of several Denominations, you must begin to subtract at the least Denomination next your right hand, and subtract each Denomination from his same, and set down the remainer of each Denomination under his own proper Denomination; but if in the Denomination of Farthings, your lower Number be greater than your upper, you must borrow 1 Peny

which is 4 Farthings, to add to the uppermoſt, and when you ſubtract the Pence, then add 1 Penny to the lower Number of Pence for paiment of the Penny or 4 Farthings you borrowed. Likewiſe if in the Denomination of Pence the lower Number be greater than the upper, borrow 1 Shilling or 12 Pence to add to the uppermoſt, remembring to add 1 Shilling to the lower Number of Shillings for paiment of 12 pence you borrowed. And in like manner, if the lower Number of Shillings exceed the upper, as you may eaſily diſcern by the following Example of Pounds, Shillings, Pence and Farthings.

Example.

	l.	*s.*	*d.*	
Received ———————	7836	14	7	$\frac{1}{4}$
Paid ———————	4524	17	9	$\frac{3}{4}$
Remains ———————	3311	16	9	$\frac{1}{2}$
Proof ———————	7836	14	7	$\frac{1}{4}$

Here is received 7836 *l.* 14 *s.* 7 *d.* $\frac{1}{4}$, and out of it is paid 4524 *l.* 17 *s.* 9 *d.* $\frac{3}{4}$; it

it is required what is left of the ſaid Sum. I ſet the two Sums down as you ſee according to the former directions, and begin at the leaſt Denomination which is Farthings, ſaying, $\frac{1}{4}$ from $\frac{1}{4}$ I cannot, but 1 Penny as I borrowed which is 4 Farthings and 1 Farthing is 5 Farthings, 3 Farthings from 5 Farthings and there remains 2 Farthings, which is $\frac{1}{2}$, which $\frac{1}{2}$ I ſet under the Line, and right under the Denomination of Farthings; then I go to the next Denomination, which is Pence, and becauſe I borrowed one Penny in the Farthings, I now pay it again, ſaying, 1 Penny as I borrowed and 9 Pence is 10 Pence, from 7 Pence I cannot, but 1 ſhilling which is 12 Pence, and 7 Pence is 19 Pence, and 10 Pence from 19 Pence and there remains 9 Pence, ſetting 9 under the Line and under the Denomination of Pence; then I proceed to the Shillings, and becauſe I borrowed one Shilling in the Pence, I pay it again; ſaying, 1 Shilling as I borrowed and 17 Shillings is 18 Shillings, from 14 Shillings I cannot, but 1 Pound as I borrowed which is 20 Shillings and 14 Shillings is 34 Shillings, 18 Shillings from 34 Shillings and there remains 16 Shillings, ſo I ſet down

16 under the Denomination of Shillings; then I go to the Pounds, and by reason I borrowed 1 Pound in the Shillings, I pay it, saying, 1 as I borrowed and 4 is 5, 5 from 6 and there remains 1; setting 1 under the first Figure of the Denomination of Pounds; so proceeding I say, 2 from 3 and there remains 1, 5 from 8 and there remains 3, and 4 from 7 and there doth remain 3, setting down each remainer under his respective Figure as you see. So there doth remain 3311 *l.* 16 *s.* 9 *d.* ½. And in like manner for any other Sum of the same Denomination.

Subtraction of Haverdupoize *Weight.*

The several Denominations of *Haverdupoize* Weight, you may acquaint your self with by the Table of *Haverdupoize* in the second Chapter.

Suppose I have bought 45 *C.* 3 *quarters*, 16 *l.* of Sugar, and I have sold 28 *C.* 1 *quarter*, 24 *l.* of the same Sugar; it is required what is left of this parcel. I set down the Numbers according to the foregoing Directions, finding therein three Denominations, *viz.* Hundreds, Quarters, Pounds;

Pounds; therefore I begin saying, twenty four from sixteen I cannot, but one quarter as I borrowed which is 28 Pound and 16 is 44, 24 from

	C.	qr.	l.
Bought	45	3	16
Sold	28	1	24
Remains	17	1	20

44 and there remains 20. Then one as I borrowed and 1 is 2, from 3 and there remains 1. Then I come to the Hundreds; saying, 8 from 5 I cannot, but 8 from 15 and there doth remain 7, 1 as I borrowed and 2 makes 3, from 4 and there remains 1. So I find there doth remain unsold 17 *C.* 1 *quarter*, 20 *l.*

Sometimes it happeneth that there are many Sums of Numbers to be subtracted from one Sum or Number, as suppose I have bought a Butt of Currans weighing 18 *C.* 1 *quarter*, 21 *l.* and at several times I have sold several parcels; as, 4 *C.* 3 *qu.* 17 *l.* at one time; 3 *C.* 3 *quarters*, 20 *l.* at another; and 2 *C.* 1 *quarter*, 16 *l* at another time; 1 *C.* 2 *quarters*, 0 *l.* at another time; and 1 *C* 3 *qu.* 24 *l.* at another time; and 3 *qu.* 12 *l.* at another time. The question is what is remaining unsold in the Butt of Currans?

 Example.

Example.

	C.	qu.	l.
Butt of Currans containeth	18	1	21
Sold out of it at several times	4	3	17
	3	3	20
	2	1	16
	1	2	00
	1	3	24
		3	12
	25	2	25
	2	2	24

In order to answer this question, I first set down the neat weight of the But of Currans, *viz.* 18 *C.* 1 *qu.* 21 *l.* drawing a Line underneath. I set down under that Line the several parcels sold out of this Butt of Currans, one under the other, and bring all these parcels under the Line into one Sum by *Addition*, as you see in the Example, which Sum amounts unto 15 *C.* 2 *quarters*, 25 *l.* which I subtract from the weight of the Butt of Currans first set down

down by the foregoing Instructions of this Chapter for Subtraction of *Averdupoize* weight.

Subtraction of Troy *Weight.*

Example.

	l.	*oz.*	*p.wt.*	*gr.*
Bought —— ————	20	08	16	21
Sold ——— ——— ———	12	10	14	22
Remaineth ——— ———	7	10	01	23

Here I begin to subtract; saying, 22 from 21 I cannot, but 1 as I borrowed from the Penny weights which is 24 Grains and 21 Grains is 45 Grains, and 22 from 45 and there remains 23 then 1 Penny weight as I borrowed and 14 Peny weights is 15, from 6 and there remains 1; then 10 from 8 I cannot, but 1 Pound as I borrowed which is 12 ounces, and 8 is 20, and 10 from 20 and there remaineth 10; then 1 Pound as I borrowed and 2 is 3 Pounds, 3 from 0 I cannot, but borrow 1 and say, 3 from 10 and there remaineth 7; 1 as I borrowed and 1 is 2 from 2 and

 there

there remains 0. So there remaineth in all 7 Pound, 10 Ounces, 1 Penny weight, 23 Grains.

Subtraction of Apothecaries Weights.

Example.

	℔.	℥.	ʒ.	℈.	gr.
Bought ——— ———	12	9	5	1	12
Sold ——— ———	7	6	7	2	15
Remains ——— ———	5	2	5	1	17

Here in this Example you say, 15 from 12 I cannot, but 1 as I borrowed from the next Denomination being Scruples containing 20 Grains, and 12 Grains is 32 Grains, then 15 from 32 and there remains 17; then proceed and say, one Scruple as I borrowed and 2 makes 3 from one Scruple I cannot, but 1 as I borrowed from the Drachms containing 3 Scruples and one is 4, three from 4 and there remains 1. Then I proceed to the next Denomination; saying, 1 as I borrowed and 7 is 8 from 5 I cannot, but one as I borrowed from the Ounces containing 8 Drachms and 5 is 13, 8 from

8 from 13 and there remains 5. Then proceeding to the next Denomination; saying, 1 as I borrowed and 6 is 7 from 9 and there remains 2. Then proceeding to the last Denomination; I say, 7 from 12 and there remains 5. So there will remain 5 ℔. 2 ℥. 5 ʒ. 1 ℈. 17 *gr.* which doth remain unsold of that parcel.

Subtraction of Wine Measure.

For the Contents of the several Denominations of Wine Measure, you may see by the Table in the second Chapter, and also the way of Subtraction in this Measure, by this Example.

Example.

	Tuns.	*hogsh.*	*gal.*	*pottl.*	*qrt.*	*pt.*
Bought	148	3	45	1	1	1
Sold	84	2	57	0	1	0
Remains	64	0	51	1	0	1

Sub-

Subtraction of Beer Measure.

The Table of Beer Measure in the ſecond Chapter will ſhew you the Content of the ſeveral Denominations, and the way of ſubtracting by the following Example.

Example.

	Bar.	kild.	firk.	gal.	pot.	qrt.	pt.
Bought ————	36	1	0	7	0	1	0
Sold ————	27	0	1	8	1	1	1
Remains ———	9	0	0	7	0	1	1

Subtraction of Dry Measure.

In the ſecond Chapter, by the Table of Dry Meaſure, you may find the Contents of all the Denominations. And by the following Example you may alſo ſee the manner of Working.

Example.

Example.

	Qu.	bush.	pec.	pin.
Bought	43	3	2	15
Sold	27	5	3	09
Remaineth	15	5	3	06

Subtraction of Long Measure.

The Table of Long Meaſure in the ſecond Chapter, will inform you of the ſeveral Denominations and their Contents, and the way of ſubtracting by the following Example.

Example.

Engl. Mile.	furl.	pole.	yard.	feet.	inch.	B.Corn.
156	5	33	4	3	11	2
98	7	17	5	2	07	1
57	6	15	4½	1	04	1

Sub-

Subtraction of Cloath Measure.

Here it will be convenient to let you know as by the ſaid Table, in the ſecond Chapter of *Addition*; you may diſcern, that in Cloth Meaſure there be three ſorts of Meaſures. As, Broad Cloth is meaſured by Yards, Quarters and Nails; Linnen Cloth in *England*, by Ells, Quarters and Nails; and Linnen Cloth in *Holland*, by Flemiſh Ells, Quarters and Nails. In each of which it will be convenient to give an Example; and to note that whereas by the Table of Cloth meaſure in *Addition* you find 4 Quarters is 1 Yard, 5 Quarters 1 Engliſh Ell, and 3 Quarters 1 Flemiſh Ell, it is to be 5 ſuch Quarters as one Yard doth contain, *viz.* 1 Quarter more makes an Ell Engliſh, and 3 Quarters of our Engliſh Yard makes 1 Ell Flemiſh.

	Example 1.			*Example 2.*		
	Yard.	*qrs.*	*na.*	*Ells.*	*qr.*	*n.*
Bought in England—	215	3	1	163	4	2
Sold————	127	2	2	86	4	3
Remaineth ————	88	0	3	76	4	3

Exam-

Example 3.

	Flem. Ells.	qrs.	nails.
Bought ———	479	1	2
Sold--------	247	2	3
Remaineth -	231	1	3

Subtraction of Time.

You will find by the Table of Time that 60 Minutes make an Hour, 24 Hours one Natural Day, 365 Days one Year; by the following Example of *Subtraction* you more plainly underſtand how to work all ſuch like Examples.

Example.

Years.	days.	hours.	min.
348	340	16	45
179	285	12	25
169	55	04	20

Proof

Proof of Subtraction.

When your Subtraction is ended, if you desire to prove your work, whether you have done right or wrong; add the Remainer to the Number that was to be subtracted, and if the sum of those two Numbers be equal to the greater Number, or numbers from whence the Subtraction was to be made, then your Subtraction was true, otherwise false. Thus let us prove the second Example of this Chapter, where after Subtraction is ended, the Numbers stand as you see, the Remainder or difference being 3311 *l.* 16 *s.* 09 *d.* $\frac{1}{2}$, now to prove the work I add this remainer 3311 : 16 : 9 : 2, to the number that was to be subtracted which is 4524: 17 : 9 : 3 : and the Sum of these two Numbers is 7836 *l.* 14 *s.* 7 *d.* $\frac{1}{2}$, being equal to the Number from whence the Subtraction was to be made. Therefore I do conclude the subtraction is true.

l.	*s.*	*d.*	*f.*
7836	14	7	1
4524	17	9	3
3311	16	9	2
7836	14	7	1

CHAP.

CHAP. IV.

Multiplication.

MUltiplication is a Rule which teacheth by two Numbers given to produce a third Number, which ſhall contain one of the given Numbers ſo often as there be Units in the other; and it ſerveth inſtead of many Additions, being a Compound of many equal numbers into one Sum, by multiplying one Sum into another. For it increaſeth one Number ſo often as there are Units in the other.

2. *Multiplication* doth conſiſt of three parts or numbers. That is to ſay, the Multiplicand, the Multiplicator, and the Product.

Multiplicand	384
Multiplicator	23
	1152
	768
Product	8732

The Multiplicand is the Number to be multiplied. The Multiplicator is the Number given by which the Multiplicand is to

be

be multiplied. And the Product is the Number which cometh of the Multiplication; as you see in the Margent: 384 is the Multiplicand or Number to be multiplied; 23 is the Multiplicator or Number by which the Multiplicand is to be multiplied; and 8732 is the Product or Number that ariseth and cometh by the said Multiplication, containing the Multiplicand so often as there are Units in the Multiplier, that is 23 times. For the Product contains the Multiplicand as many times as there be Units in the Multiplicator.

It maketh no difference which of the two given Numbers you make the Multiplicand or the Multiplicator, for 8 multiplied by *6*, is as much as *6* multiplied by 8; but commonly the greatest Number is made the Multiplicand, standing uppermost; and the lesser Number the Multiplicator, standing under the Multiplicand.

The Learner must get the following Table compleatly by heart, before he can proceed any further in Arithmetick, because there is no Rule in Arithmetick but hath a great dependance upon *Multiplication* and *Division*.

Multi-

Multiplication Table.

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

The uſe of this Table is not difficult, in the top of the Table you have theſe Numbers, 1, 2, 3, 4 5, 6, 7, 8, 9, 10, 11, 12; and likewiſe down the firſt Column towards your left hand you have the ſame Figures, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12; and in their reſpective Columns you have all thoſe Numbers multiplied by one another. So that if you would know the Product of any two given Numbers from 1 to

12 multiplied together, look for either of the two given Numbers in the top or uppermost Column, and for the other in the side Column, guiding your eye in the same until you come under the other Figure or Number in the uppermost Column, and in the common Angle or Meeting, you shall have the Product required. Example, I desire to know the Product of 9 multiplied by 7. In the uppermost Column I find 9, and in the side Column 7; and carrying my eye along the row or Column against 7, until I come under 9 in the uppermost Column, I meet with 63, which is the Product of 9 and 7 multiplied together. And if you look for 7 in the top, and go down the same Column until you come against 9 in the side you will find 63 as before; so it matters not which you look for in the uppermost Column, or which in the side Column. This Table being compleatly gotten without Book, the Learner may proceed to the practice of *Multiplication*.

In *Multiplication* if the Multiplicand consist of many places, and the Multiplicator of one place, set down the Multiplicand, and under it in the place of Units set down the Multiplier, and draw a Line

under-

underneath them, and multiply one into another, beginning at the place of Units, and proceeding towards the left hand, setting down each particular Product as you go, and if any particular Product amount to ten or any Number of tens, set down a 0, and for every ten carry so many Units to the next Product; and if any particular Product exceed ten or any Number of tens, set down the excess, and for every ten carry so many Units to the next Product; and when you come to the last Figure, set down the total Product, as by the following Example will appear; where it is required to multiply 7958 by 7. First, set down 7958 for the Multiplicand, and under it in the place of Units set down 7 for the Multiplicator, then drawing a Line I begin finding by the former Multiplication Table, that 7 times 8 is 56, I set down 6 being the excess of 5 tens,

$$\begin{array}{r} 7958 \\ 7 \\ \hline 55706 \end{array}$$

and for those 5 tens I carry 5 to the next Product. Now proceeding towards the left hand to the next figure 5; saying, 7 times 5 is 35, and 5 as I carried is 40, set down 0, and for the 4 tens carry 4 to the next Product; saying, 7 times 9 is 63, and

and 4 as I carried is *67*, ſetting down 7, and carry *6* to the next Product for ſo many tens. Then I proceed; ſaying, 7 times 7 is 49, and *6* as I carried is 55; which being the laſt Product I ſet down the whole Product 55, having finiſhed the ſaid Multiplication and finding the Product to be 55706 as was required.

In *Multiplication*, if both the Multiplicand and the Multiplier do conſiſt of divers places. Begin firſt with that Figure of your Multiplier as doth ſtand in the place of Units, multiplying it into all the Figures of the Multiplicand, placing the Product below the Line, according to the Inſtructions of the laſt Example. Then begin a new Product with the next Figure of the Multiplier, ſtanding in the place of tens, multiplying it into all the places of the Multiplicand, and ſet the Product thereof under the firſt Product, but one Figure more towards the left hand. In like manner multiply the third, fourth and fifth Figures, *&c.* until you have multiplied all the Figures of the Multiplier into all the Figures of the Multiplicand, remembring to ſet the place of Units of the ſecond Product under the place of tens in the firſt Product,

Product, and the place of units in the third Product, under the place of tens in the ſecond Product, and the place of units of the fourth Product under the place of tens in the third Product; and in like manner for as many Products as there be Figures in the Multiplier, which will cauſe every Product to ſtand one Figure ſhort of one another towards the right hand, according to the foregoing Inſtructions, the undermoſt Product ſtanding one Figure more towards the left hand than his undermoſt; as you ſee by the following Example.

It is required to multiply 486739 by 4387. I ſet them down, the leſſer under the greater, according to the Inſtructions in the beginning of this Chapter, and drawing a Line under them, I begin with the firſt Figure of your Multiplier, ſtanding in the place of Units which is 7; ſaying, 7 times 9 is 63; I ſet down 3 and carry 6. Then 7 times 3 is 21, and 6 as I carried is 27; ſet down 7 and carry 2. Then 7 times 7 is 49, and 2 as

```
      486739
        4387
     -------
     3407173
    3893912
   1460217
  1946956
  ----------
  2135323993
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as I carried is 51, that is 1 and carry 5. Then 7 times *6* is 42, and 5 as I carried is 47; set down 7 and carry 4. Then 7 times 8 is 56, and 4 as I carried is *60*; setting down 0 and carrying *6*. Then 7 times 4 is 28, and *6* as I carried is 34; setting 4 and 3 after him as you see. So the first Product will be 3407173. Then I proceed to the next Figure of the Multiplier which is 8, for a new Product. Saying, 8 times *9* is 72; now I must remember the former Instructions for placing the several Products, *viz.* to place the first Figure or place of Units of your second Product, under the second Figure or place of tens in the first Product. Therefore for 72 I set down 2 under the second Figure of the first Product being 7, and carry 7. Then 8 times 3 is 24, and 7 as I carried is 31; set down 1 and carry 3. Then 8 times 7 is 5*6*, and 3 as I carried is 5*9*; set down *9* and carry 5. Then 8 times *6* is 48, and 5 as I carried is 53, set down 3 and go 5. Then 8 times 8 is *6*4, and 5 as I carried is *69*; set down *9* and carry *6*. Then 8 times 4 is 32, and *6* as I carried is 38; I set down 8 and 3 behind being the last of that Product. Next I proceed to the third Figure of the Multiplier; saying, 3 times *9* is 27; setting down

down 7 under the 1, which is the ſecond Figure of the laſt Product, and I carry 2. then 3 times 3 is 9, and 2 as I carried is 11; ſet down 1 and carry 1. Then 3 times 7 is 21, and 1 as carried is 22; ſet down 2 and carry 2. Then 3 times 6 is 18, and 2 as I carried is 20; ſet down 0 and carry 2. Then 3 times 8 is 24, and 2 as I carried is 26; ſetdown 6 and carry 2. Then 3 times 4 is 12, and 2 as I carried is 14; I ſet down 14 being the laſt Figure multiplied in that Product. Then I next proceed to the fourth Figure of the Multiplier, which is 4. Saying, 4 times 9 is 36; ſetting down 6 under 1, according to the former Inſtructions, and I carry 3. Then 4 times 3 is 12, and 3 as I carried is 15; ſet down 5 and carry 1. Then 4 times 7 is 28, and 1 as I carried is 29: ſet down 9 and carry 2. Then 4 times 6 is 24, and 2 as I carried is 26: ſet down 6 and carry 2. Then 4 times 8 is 32, and 2 as I carried is 34, ſet down 4 and carry 3, then 4 times 4 is 16, and 3 as carried is 19: ſet down 19, being the laſt Figure of your Multiplicand.

You muſt obſerve the ſame order in placing the reſpective Products, and the Figures of each Product one under the other,

as you see in the Example, and draw a Line, and by the Instructions of the second Chapter, add those several Products up into one Sum under the Line, which will be 2135323993, the true Product required being equal to 4387 times 486739, or 486739 times 4387.

In the same manner are all Multiplications to be wrought, although there are more Figures either in the Multiplicand or Multiplier.

Another way of Multiplication.

The carrying of one Number is a little difficult to young Learners in this Art, or to such as do not frequently exercise themselves therein. Therefore for the help of such capacities, I shew you a plain and easie way for finding the several Products that are made by Multiplying the Multiplicand, by the several Figures of the Multiplier.

When you have two Numbers given to be multiplied one by another, multiply the greater Number by all the nine digits by continual Addition nine times over, setting the several Sums down Table-wise as you see in the following Example. The first Addition being as much as a Multiplication by 2, the second Addition being a Multi-
plication

plication by 3, the third Addition being a Multiplication by 4, the fourth a Multiplication by 5, the fifth a Multiplication by 6, the ſixth a Multiplication by 7, the ſeventh a Multiplication by 8, the eighth a Multiplication by 9. So have you the ſeveral Products of the Multiplicand, when it is multiplied by all the nine digits, caſt up to your Hand by *Addition*, which you may chooſe out according to your Figures of the Multiplier, ſetting your ſeveral Products down one under another, according to the Inſtuctions of the laſt Example.

Example.

It is required to multiply 3968473 by 74698. Firſt I ſet down the Multiplicand.

3968473	1	3968473
74698	2	7936946
31747784	3	11905419
35716257	4	15873892
23810838	5	19842365
15873892	6	23810838
27779311	7	27779311
296436996154	8	31747784
	9	35716257

The Multiplicand being doubled, which is multiplying by 2, the Product or Sum is 7936946, the Multiplicand added to that Sum, the Sum of them will be 11905419, which is the firſt Number multiplied by 3. The firſt Number added again giveth 15873892, being the Product of the firſt Number multiplied by 4. The next Addition giveth 19842365, or the firſt Number multiplied by 5. The next Addition giveth 23810838, or the Product of the firſt number multiplied by 6. The next Addition giveth 27779311, or the Product of the firſt Number multiplied by 7. The next Addition giveth 31747784, or the Product of the firſt Number multiplied by 8. And the laſt Addition gives 35716257, or the Multiplication of the firſt Number by 9.

Here have you the firſt Number or Multiplicand multiplied by all the nine digits, which Products ſet one under the other as you ſee, your Multiplier being ſet under the Multiplicand, and a Line drawn, you take notice what figure ſtands in the firſt place of the Multiplier, which in this Example is 8, and againſt 8 I find this Sum 31747784, which I ſet down under the Line

Line as you ſee. The next Figure of the Multiplier is 9, againſt which Figure ſtands this Sum 35716257, which I ſet under the other as you ſee. The next Figure of the Multiplier is 6, againſt it ſtands 23810838, which I ſet under the laſt Number as you ſee. The next Figure of the Multiplier is 4, againſt that ſtands 15873892, which muſt be ſet under the laſt Number as you ſee. And the laſt Figure of the Multiplier is 7, and againſt that ſtands 27779311, which muſt likewiſe be ſet under the laſt Number, obſerving the ſame order in ſetting down the Sums as you ſee, according to the Inſtructions in the laſt Example but one of this Chapter, and drawing a Line, by adding up thoſe Sums you will find the true product requir'd to be 296436996154 being equal to 74698 times 3968473, or unto 3968473 times 74698.

Abbreviations in Multiplication.

Firſt, if you are to multiply any Number by 10, you need do no more but ſet a Cypher 0 to the right hand of all the Figures. As, 5978 multiplied by 10, makes 59780. In the ſame manner if you were to multiply any

any Number by 100, add the ſaid Number two Cyphers thus 00, if by 1000 add three 000.

Secondly, if you are to multiply any Number by 20, 30, 40 or by 200, 300, 400, or any Number with more Cyphers at the end, ſet them as you ſee in the Example, as if you were only to multiply by Figures; and let the Cypher or Cyphers hang over, and add them to the Product, as in this Example.

```
 367
  300
------ --
110100
```

Thirdly, if you are to multiply any Number, that hath a Cypher or Cyphers at the end, by another Number which hath a Cypher or Cyphers in the end thereof, ſet them as you ſee in the Example, in ſuch manner as the firſt figure of the Multiplier may ſtand under the firſt Cypher of the Multiplicand, and caſt up the Product as you ſee is here done.

```
 6700
   600
------- -
4020000
```

Fourthly, if there be a Cypher in the middle of your Multiplier, you need do no more but put a Cypher under the ſecond Figure of the foregoing Product, to fill up room, and ſet down the firſt Figure

Figure of the next Product next to the Cypher in the ſame Line, as by the Example you may plainly perceive.

3465
607
24255
207900
2103255

The Proof of Multiplication.

The ſureſt way to prove *Multiplication* is by *Diviſion*. But there is a way to prove *Multiplication* by the Croſs, which is thus.

First, add up all the Figures of the Multiplicand, as in the Example of *Multiplication* of four Figures.

	1	
4	X	7

Saying, 3 and *9* is 12, and *6* is 18, and 8 is 2*6*, and 4 is 30, and 7 is 37, and 3 is 40. How many times *9* can I have in 40? 4 times *9* is 3*6*, and there remains 4; ſet down 4 by the Croſs.

Secondly, do the ſame by the Multiplier. Saying, 7 and 4 is 11, and *6* is 17, and *9* is 2*6*, and 8 is 34; 3 times *9* is 27 from 34 and there doth remain 7; which ſet down on the other ſide of the Croſs.

Thirdly, multiply these two Numbers together. Saying, 4 times 7 is 28; 3 times 9 is 27 from 28 and there remains 1; which I set over the Cross.

Fourthly, I do the like by the Product as I did by the Multiplicand and the Multiplier, and I find there will remain 1; therefore I conclude the Multiplication is right.

CHAP. V.

Of Division.

Division is a Rule which teacheth to part any Number into any quantity of equal parts assigned, or to find how often any Number given doth contain a less Number. That is to say, by two Numbers given to find out a third Number, which third Number shall contain so many Units as the lesser of the two given Numbers is contained times in the greater.

Division hath four parts, *viz.* the Dividend, the Divisor, the Quotient, the Remainer.

The

The Dividend is the Number given to be parted or divided.

The Diviſor is the Number given, by which the Dividend is to be divided, and is always the leſſer of the two given Numbers, or the Number that ſheweth how many parts the Dividend is to be parted or divided into.

The Quotient is the Number that is produced of the parting or dividing the Dividend by the Diviſor, and is the Number that tells you how many times the leſſer Number is contained in the greater.

The Remainer is a Number always leſs than the Diviſor.

Example.

There are two given Numbers 97862 for the Dividend, and 246 for the Diviſor. Now if the firſt Figure of your Diviſor towards your left hand be leſs than the firſt Figure of your Dividend, as in the following Example it is ſet, the firſt Figure of the Diviſor under the firſt Figure of your Dividend, as you ſee: but if it be greater, then ſet the firſt Figure of the Diviſor under the ſecond Figure of the Dividend, and the

2 4
~~8~~ ~~6~~ 0
~~9~~ ~~7~~ ~~8~~ 3 4 2 (3
~~2~~ ~~4~~ ~~6~~

rest in their order, keeping your Figures exactly one under another.

Now beginning the said Example, I ask how many times 246 is contained in 978, but for the more easie working I need but say, how many times 2 is contained in 9, I find 4 times, therefore upon a piece of wast paper, prepared for that purpose, I multiply the Divisor by 4, the Product will be 984, which cannot be subtracted out of 978; therefore I find the Divisor will go but 3 times in 976; I set down 3 in the Quotient, making a separation as you see between the Dividend and the Quotient, then you begin to multiply your Divisor at the right hand end; saying, 3 times 6 is 18, cancel the 6. Then 8 from 8 and there remains 0, and 1 from 7, cancel the 7, and there remains 6. Then 3 times 4 is 12, cancel the 4, saying, 2 from 6 and there remains 4, and 1 from 9 and there remains 8, setting 8 over 9, and 4 over 6, cancelling the 9 and 6. Then 3 times 2 is 6, cancel the 2; and say, 6 from 8 and there remains 2, and the Division stands as you see.

Next

Next to proceed for finding the next Figure of the Quotient, I remove my Diviſor one Figure more towards the right hand, there ſtanding over the Diviſor theſe uncancelled Figures 2403. I ask how many times 2 the firſt Figure of the Diviſor in 24 I find 9 times by multiplying the Diviſor by on waſt paper: therefore I ſet down 9 in the quotient after the 3. Then begin to multiply the Diviſor; ſaying, 9 times 6 is 54, 4 from 3 I cannot, but borrowing 1 and ſaying, 4 from 13 and there remains 9, cancelling the 6 and 3 and ſet 9 over it,

```
   1
  09
 138
 244
 8609
 978342 (39
 2466
   24
```

and 1 as I borrowed and 5 is 6, from 0 I cannot, but borrowing 1, ſaying 6 from 10 and there remains 4, and 1 as I borrowed from 4 and there remains 3. Then 9 times 4 is 36, 6 from 4 I cannot, but 6 from 14 and there remains 8, cancel 4 at bottom and 4 above, ſetting 8 the remainer over head, than 1 as I borrowed and 3 is 4, from 3 I cannot, but 4 from 13 and there remains 9, and 1 as I borrowed from 2 and there remains 1. Then 9 times 2 is 18, cancel

cancel the 2, and ſay, 8 from 9 there remains 1, and 1 from 1 and there remains 0. So there is two Figures of the Quotient finiſhed.

I remove the Diviſor one Figure more towards the right hand, as by the Example doth appear, then over the firſt Figure of the Diviſor towards the left hand which is 2 there ſtands 18. So I demand how many times 2 in 18 ? anſwer is 8 : ſo for experience I multiply the Diviſor 246 by 8, the Product will be 1968 which doth exceed 1894 the Number ſtanding over it : therefore I do conclude the Diviſor muſt go but 7 times ; I ſet down 7 for the third Figure of the Quotient, and proceed, ſaying, 7 times 6 is 42, 2 from 4 and there remains 2, and 4 from 9 and there remains 5, cancelling the 6, 4 and 9, ſetting the remainer over head. Then 7 times 4 is 28, cancel the 4, and 8 from 5 I cannot, but 8 from 15 and there remains 7, 1 as I borrowed and 2 is 3 from 8 and there

```
  0
 11
095
13387
24445
86092
978342 (397
24666
 244
  2
```

there remains 5, cancelling your Figures as you ſubtract from. Then 7 times 2 is 14, 4 from 5 and there remains 1, and 1 from 1 and there remains 0, there being theſe Figures uncancelled 1722.

Now I muſt remove the Diviſor one Figure more towards the right hand, as by the Example, and over the firſt Figure of your Diviſor towards the left hand there will ſtand 17, I demand how many times 2 can I have in 17, I find but 7 times, ſo I ſet 7 in the Quotient and proceed in Multiplying the Diviſor thereby. Saying, 7 times 6 is 42, cancel the 6; then 2 from 2 and there remains 0, and cancel the 2; and 4 from 2 the next Figure I cannot, but 4 from 12 and there remains 8, and 1 as I borrowed from 7 and there remains 6, cancelling 2 and 7 and ſet the remains over head. Then 7 times 4 is 28, 8 from 8 and there remains 0, and 2 from 6 and there remains 4, cancelling 4 in the Diviſor, and

```
  000
  114
 0956
 13870
 24458
 860920
 978342 (3977
 246666
  2444
   22
```

and 8 and 6 in the Dividend. Then laſt of all 7 times 2 is 14, 4 from 4 and there remains 0, and 1 from 1 and there remains 0. The Diviſion is now compleated, and I find by the Quotient that the Diviſor 246 is contained 3977 times in the Dividend 978342, and there doth remain nothing.

A more eaſie and plainer way of Diviſion.

There is a far plainer and better way of *Diviſion*, than this cancelling and ſcratching of Figures, which I much admire that the Schoolmaſters in theſe times do not practiſe, the other way being too hard and difficult for a Learner, for I have known many that have learned ſo far as *Diviſion* with a great delight and chearfulneſs, but with the hardneſs and difficulty of *Diviſion* have been quite diſheartned from proceeding any further. But this way that I intend to ſhew the Learner is ſo plain, eaſie and delightful that the meaneſt and ordinarieſt capacity may attain the knowledge thereof by the help of the former Rules.

Exam-

Example.

It is required to divide 8748 by 36. Firſt, ſet down the Diviſor 36, and ſome little diſtance in the ſame Line ſet down the Dividend, making a ſeparation between them, as you ſee in the following Example. So I demand how many times 36 I can have in 87, I find 2 times, I ſet 2 in the Quotient, and by it I multiply the Diviſor, ſaying, 2 times 6 is 12, ſetting 2 under the 7, which is the ſecond Figure of Dividend, then proceeding to the next Figure of the Diviſor; ſaying, 2 times 3 is 6, and 1 as I carried is 7, ſetting down the 7 under 8, ſo there is 72 the Product of the Diviſor multiplied by 2, under which I draw a Line and ſubtract one from the other by the third Chapter, andthere will remain 15, which place under the Line, at which time the Operation will ſtand as you ſee.

```
36)  8748 (2
     72·
     ———
     15
```

Next you muſt make a prick under the next Figure of the Dividend being 4, and ſet 4 before the remainer 15, ſo you ſhall have

have 154 for a new Dividend, as you ſee.

```
36) 8748 (24
    72..
    ----
     154
     144
    ----
      108
```

Now I demand how many times 3 in 15, I find 4 times; ſo I ſet 4 for the ſecond Figure in the Quotient, and I multiply the Diviſor thereby, and the Product 144 I ſet under the new Dividend 154, and drawing a line, by the third Chapter I ſubtract one from the other and there will remain 10.

Laſtly, I ſet a prick under the next Figure of the Dividend, which is the laſt, being 8, and drawing it down I ſet it before the Remainer 10, by which I have 108 for a new Dividend.

```
36) 8748 (243
    72
    ----
     154
     144
    ----
      108
      108
     ----
        0
```

Then I ask how many times 3 I can have in 10? I find 3 times, therefore I ſet down 3 in the Quotient, and multiplying the Diviſor thereby, I ſet the Product which is 108 under the laſt Dividend, and ſubtracting one from another there doth remain 0, and the

the whole work of the Division is finished.

But if it doth fall out that the first Figure towards your left hand of your Dividend be less than the first Figure of the Divisor towards the left hand, or if all the Figures of the Divisor be they more or less, do amount to more than so many Figures of the Dividend, set a prick one Figure nearer the right hand, as if in such case the Divisor doth consist of three Figures, then you must begin under the fourth Figure of your Dividend from your left hand, and seek how often the first Figure on the left side of your Divisor is contained in the two first Figures to the left side of the Dividend, and place the answer in the Quotient; by which Figure multiply the Divisor, and place the Product thereof under the Dividend in order, and deduct one from another and proceed, always remembring in all the varieties of *Division*, that if you find by *Multiplication* the Product to be at any time greater than the Dividend, you must take a Figure lesser for your Quotient number by a Unite, or one.

Exam-

Example.

It is required to divide 3865498 by 487. I set the Divisor and Dividend according to the former Instructions, as you see in the following Example. And because the 3 first figures of your Dividend is less than the Divisor, I set a prick under the fourth figure from the left hand being 5, then ask how many times 4 in 38, answer is 8 times, now for experience sake, upon wast paper I multiply the Divisor 487 by 8, and the Product I find will be 3896, which is greater than my Dividend 3865, therefore it must go but 7 times, so I set 7 in the Quotient, and multiplying the Divisor by 7, the Product 3409 I set under the Dividend 3865, and by subtracting I find there will remain 456.

```
487) 3865498 (7
     3409·
     -----
      456
```

Now according to the former Instructions, I set a prick under the next figure which is 4, drawing it down and set it before the Remainer; so have I 4564 for a new Divi-

Dividend. Then do I ask how many times 4 will go in 45, anſwer is 9 times, and finding by *Multiplication* it will bear ſo much, I ſet down 9 in the Quotient, and multiply the Diviſor thereby, the Product there-of being 4383 I ſubtract from the Dividend, and there doth remain 181, the work ſtanding as you may ſee.

```
487) 3865498 (79
     3409·
     ----
      4564
      4383
      ----
       181
```

I again proceed to the next figure of the Dividend, which is 9, and likewiſe according to Rule I ſet a Prick under him, and drawing him down I ſet him before the laſt Remainer 181, ſo I have 1819 for a new Dividend. Then I do aſk how many times 4 in 18? anſwer is 3 times, for the Product ariſing by 4, will be greater than the

```
487) 3865498 (793
     3409··
     ----
      4564
      4383
      ----
       1819
       1461
       ----
        358
```

Dividend

Dividend 1819, therefore I ſet down 3 in the Quotient, and Multiplying the Diviſor thereby, I ſet its Product 1461 under the laſt Dividend, and by ſubtracting I find there doth remain 358, as you ſee in the Example.

Laſtly, I ſet a prick under the next and laſt figure of the Dividend which is 8, drawing it down I ſet the ſaid figure before the laſt Remainer 358, which gives me 3588 for a new Dividend. I now demand how many times 4 the firſt Figure of the Diviſor I can have in 35, by examination I find it will go but 7 times, therefore I ſet down 7 in the Quotient, and multiplyingthe Diviſor by it, the Product of that Multiplication I ſet under the laſt new Dividend 3588, and ſubtracting one from another I find

```
487) 3865498 (7937
     3409...
     -------
      4564
      4383
      -------
       1819
       1461
       -------
        3588
        3409
        -------
         179
```

find there will remain 179. Now the Division is finished, and I find that in 3865498 there is contained 7937 times the Divisor 487, besides 179 which doth remain.

Here you must note that many times it happens that the Dividend cannot be exactly divided by the Divisor; that is to say, after you have taken the Divisor as many times as you can out of the Dividend, yet there will remain some odd Number over and above.

But that Number which doth remain of your Division must always be less than the Divisor, or else your Division must in necessity be false; therefore you must endeavour to rectifie your work, and find out your errour, which in this plain and easie way of Division you may quickly find out, in your examination having but two things to have regard to, that is your Multiplication and Subtraction, both which in this way of Division lie so plain before your eye that they may be examined with ease and facility.

Another

Another way of Diviſion.

This way that I do intend now to explain doth not much differ from the latter way: but here you have all the Products of every Multiplication ready caſt up to your hand by multiplying the Diviſor by all the nine digits, as by the following Example doth more plainly appear.

Example.

Let it be required to divide 27232072 by 3698. Multiply your Diviſor which is 3698, by all the nine digits, which you may do by *Addition*, as you ſee in the Table, where againſt each reſpective digit you have the Product of the Diviſor multiplied by that digit, as 2 times 3698 the Diviſor is 7396, 3 times the ſaid Diviſor is 11094, 4 times the ſaid Diviſor is 14792, 5 times is 18490, *&c.*

3698	1
7396	2
11094	3
14792	4
18490	5
22188	6
25886	7
29584	8
33282	9

Therefore by the former Rules having orderly placed your Diviſor and Dividend as

3698) 27232072 (
25886·

———

1346

as you ſee, you do find the four firſt figures of your Dividend towards your left hand are leſs than the Diviſor, and becauſe the Diviſor containeth four figures, you therefore ſet a prick under the figure from your left hand, which is 2, and demand how many times the Diviſor 3698 will go in 27232, therefore I look over the Table prepared for that purpoſe, for the neareſt Number to it that is leſs, which I find is 25886, which is the Product of the Diviſor multiplied by 7, ſo I ſet 7 in the Quotient, and 25886 for a Product underneath 27232, and have drawn a Line, by *Subtraction* I find there doth remain 1346, but leſs than the Diviſor 3698.

Next I proceed to the next figure of the Dividend, which is 0, ſetting a prick under it, and by drawing it down I place it before the Remainer 1346, and I ſhall have 13460 for a new Dividend, and I ask how many times the Diviſor 3698, will go in 13460, I look in the Table of Products for the neareſt leſs Number which is

```
3698)  27232072 (73     is 11094, be-
       25886..          ing the Product
       -------          of the Divisor
         13460          multiplied by 3
         11094          wherefore I set
         -----          3 in the Quo-
          2366          tient, and the
                        said Product
                        11094 under
```

the new Dividend 13460, and by subtracting one from another, I find there will remain 2366, but yet less than the Divisor 3698.

Next I proceed to the next Figure of the Dividend which is 7, and under it I set a prick, and by drawing it down, I set it before the last Remainer 2366, and there will be this number 23667 for a new Dividend, then to know how many times the Divisor 3698 is contained in that

```
3698)  27232072 (736
       25886..
       -------
         13460
         11094
         -----
         23667
         22188
         -----
          1479
```

Dividend 23667, I look in the former Table of Products, and there I do find 22188 being the neareſt leſs Number, and the Product of the Multiplication of the Diviſor 3698 by 6: ſo I ſet 6 in the Quotient, and the ſaid Product 22188 I ſet under the laſt Dividend 23667, and after Subtraction is made, there will remain 1479, but ſtill you obſerve the Remainer is leſs than the Diviſor 3698, and by that obſervation you may ſoon diſcern an error when it is committed.

Laſtly, proceeding, I ſet a prick under the next and laſt Figure of the Divivend, and by drawing it down, ſet 2 before the laſt Remainer 1479, and you will have the number 14792 for a new Dividend, asking how many times the Diviſor 3698, will go in the Dividend 14792 in the

```
3698) 27232072 (7364
      25886..
      -----
       13460
       11094
       -----
        23667
        22188
        -----
         14792
         14792
         -----
             0
```

Table of Products, and the nearest less number to it is 14792, which is the Product of the Divisor multiplied by 4, therefore I set down 4 in the Quotient, and the said Product 14792, under the last Dividend; and by *Subtraction* I find o remains, and now having finished the Division, I do hereby find that the Dividend 27232072 contains the Divisor 3698 just 7364 times, and nothing over nor under.

67832)	8743168495	(128894
135664	67832·····	
203496	195996	
271328	135664	
339160	603328	
406992	542656	
474824	606724	
542656	542656	
610488	640689	
	610488	
	302015	
	271328	
	30687	

I

If you divide 8743168495 by 67832, the Quotient will be 128894, and there doth remain 30687, as by the foregoing Example doth appear.

By this way of multiplying your Divisor by the nine digit Numbers, you may, First observe to be very useful, not only in this way of dividing downward, but in all other ways of *Division*, whereby you may certainly know by ocular inspection how many times your Divisor is contained in your Dividend, without running the danger of mistake, by reason whereof you may be constrained to begin your work again

Secondly, if you place the Numbers found in this manner as I have shewed you, directly under the Dividends, setting Figure under figure according to the several places, your work will be much more easie, for you then have nothing to do but to subtract the two Numbers one from another, without charging your memory.

Thirdly, this way you shall have a more plain and easie Proof of the truth of your work, than in any other way, for if you add together the several Sums to be subtracted, and remain as they stand in the

order, which in the laſt Diviſion you will find to be 30687. If your work be right the Sum will exactly agree with the firſt Sum of your Dividend, as by the Proof of the laſt Diviſion here following doth appear.

```
67832
135664
 542656
  542656
   610488
    271328
     30687
──────────
8743168495
```

This being a far more eaſie and plain Proof of the work than by *Multiplication*, only you muſt obſerve this method of ſetting the Sums down, as you ſee here is done.

But becauſe *Multiplication* is the common received way to prove *Diviſion*, I will ſhew the Reader the way thereof.

When you are to prove any Diviſion by *Multiplication*, you muſt ſet the Diviſor under the Quotient, and multiply one by another according to the fourth Chapter, and

and to the Product of that Multiplication add the Remainer if there be any, and the Sum thereof will be neither more nor leſs than the Number given to be divided. As for Example.

Let it be required to prove the laſt Diviſion but one of four Figures, whoſe Diviſor is 3698, Dividend 27232072, and Quotient is 7364: therefore I ſet the Diviſor 3698 under the Quotient 7364, and by the fourth Chapter I do multiply one by another, and being no Remainer of this Diviſion the Product of the Multiplication is equal to the Dividend of the Diviſion 27232072.

```
    7364
    ----
    3698
   58912
  66276
 44184
22099
--------
27232072
```

There be ſome will pretend to prove *Diviſion* by caſting out of nines, thus.

Firſt, caſt the nines out of the Diviſor, as in the laſt Example of *Diviſion* is 6, 7, 8, 3, and 2 which make 26, from which take the nines and there doth remain 8, which I ſet on one ſide of the Croſs. Then I caſt the nines out of the Quotient and there will remain 5, which ſet on the

8 X 5

other ſide of the Croſs, and multiply the two Numbers on each ſide of the Croſs together, and there remains of the Product 4, after the nines are taken out, which 4 I keep in mind, then join the Figures remaining of the Diviſion together, *viz.* 3, 0, 6, 8 and 7, which make 24, and 4 kept in mind makes 28, nines from thence and there remains 1, which I ſet on the top of the Croſs.

Laſtly, I caſt all the nines out of the Dividend, and there will remain 1 anſwering to 1 at the head of the Croſs, and to be ſet at bottom, and when the two Figures at top and bottom of the Croſs do agree, then the Diviſion is well done, or elſe not.

Abbreviations in Diviſion.

When a Number is given to be divided by any Number that hath one or more Cyphers on the right hand, for ſo many Cyphers cut as many Figures from the right hand of your Dividend, and alſo cut off thoſe Cyphers of your Diviſor, and let the remaining Numbers of the Dividend be divided by the remaining Numbers of the Diviſor, and if any thing remain of your Diviſion,

Division, set the Figures cut off from your Dividend to the right hand of them, and this new Number is the true Remainer of the Division.

Example.

Let it be required to divide 86492 by 700, there being two Cyphers to the right hand of the Divisor, I cut off two Figures from the right hand of the Dividend, *viz.* 9, 2, and likewise the two Cyphers from the Divisor, and divide the remaining figures of the Dividend 864 by the remaining Figures of the Divisor 7, and there doth remain of that Division 3, I therefore set 92 the Figures cut off from the Dividend to the right hand of 3, and there will be 392 for the just and exact Remainer, so that the Dividend 86492 doth contain the Divisor 700, 123 times, and 392 parts of 700 over and above, as by the Example doth appear.

```
7|00 ) 864|92 ( 123
       7..
       ---
       16
       14
       ---
        24
        21
        --
        3|92
```

And hence it doth by consequence follow, that if you have any Number to divide by 10, 100, 1000, *&c.* you must cut off as many Figures from the right hand of the Dividend, as there are Cyphers in the Divisor, and those Figures remaining to the left hand shall be the Quotient, and the Figures cut off shall be the Remainer, as thus; if 3784|2 be to be divided by 10, cut off the last Figure to the right hand, as you see 3784|2 the work being done, wherein 3784 is the Quotient, and 2 is the Remainer. Likewise if the same Number were to be divided by 100, then cut off two Figures from the right hand thus, 378|42, then 378 is the Quotient, and 42 is the Remainer. And if I were to divide the same Number by 1000, then cut off three Figures thus, 37|842, and 37 shall be the Quotient, and 842 the Remainer.

Having now explained the five Species of *Arithmetick*, viz. *Numeration*, *Addition*, *Subtraction*, *Multiplication* and *Division*; being the Foundation of all the following Rules, there being no Rule in *Arithmetick* but what doth depend upon them. I would intreat the Learner to be well acquainted with these Grounds before he proceed further.

Of

CHAP. VI.

Of Reduction.

REduction is a Rule that teacheth to bring Numbers of ſeveral Denominations into one particular Denomination; whether the Denominations do ſignifie Mony Engliſh, Flemiſh or French, alſo Weights, Meaſures, &c.

Reduction is performed two ways, either by *Multiplication* or *Diviſion*.

Reduction by *Multiplication* is a reducing of great Denominations into leſs, as Pounds into Shillings, Shillings into Pence, and Pence into Farthings. Likewiſe Hundreds into Quarters, Quarters into Pounds, and Pounds into Ounces, &c. which is done by *Multiplication*.

Reduction by *Diviſion* is a reducing of leſſer Denominations into greater, as Farthings into Pence, Pence into Shillings, and Shillings into Pounds. Likewiſe, Ounces into Pounds, Pounds into Quarters, and Quarters into Hundreds, &c. which is

done by dividing that Denomination by as much as make one of a greater, as in reducing Farthings into Pence, I divide the Number propounded by 4, because 4 Farthings make 1 Penny.

Reduction of Mony.

In this Reduction of Mony as well as in other Reductions, you must consider whether the Sum propounded be to be reduced into a greater or lesser Denomination, and next consider how many of the one Denomination do make the other: by which Considerations you will know when to multiply and when to divide, and what to multiply or divide by. As for Example.

Quest. 1. In 374 Pounds it is required to know how many Shillings. Here I do consider that Pounds is the greater Denomination, and Shillings is the lesser, and that in one Pound are contained 20 Shillings, and that the Number of Shillings in 374 Pounds will be 20 times as much as 374, therefore I multiply 374 by 20, and the Product is 7480, and so many Shillings are contained in 374 Pound.

Quest.

Queſt. 2. In 526 : 18, how many Shillings and Pence?

In this Example you have two Denominations propounded to find out the Denomination of Pence, here in multiplying your Pounds by 20, you muſt take in the 18 Shillings, ſetting 8 down firſt, becauſe o cannot mulιiply, therefore multiply by the next Figure 2; ſaying, 2 times 6 is 12, and 1 is 13 ſet down 3 and carry 1, 2 times 2 is 4 and 1 is 5, ſet down 5, 2 times 5 is 10; ſetting 10 down. So the Product of this multiplicand and the odd Shillings make 10538 Shillings; now am I to reduce the Shillings into Pence, and knowing that 12 Pence make one Shilling, I therefore multiply the Number of Shillings by 12, and the Product of that Multiplication 126456 will be ſo many Pence, and ſo many Pence doth 526 Pound 18 Shillings contain.

```
  526 : 18
   20
 ------
 10538    Shil.
    12
 ------
 21076
10538
-------
126456
```

In the work of *Reduction* many times you need not run through every particular

Deno-

Denomination, but come to the thing required ſooner. As for Example.

Queſt. 3. In 398 *l.* 15 *s.* how many Farthings? Firſt, multiply 398 by 20, and taking in the odd 15 Shillings, the Product of Shillings will be 7975, then knowing that in one Shilling are 48 farthings, I do not reduce theſe Shillings into Pence as in the laſt Example, by multiplying them by 48, I do reduce them into Farthings at once, and the Product of that Multiplication is 382800, and ſo many Farthings is there in 398 *l.* 15 *s.* as was required.

```
 398 : 15
  20
 -------
 7975  Shil.
   48
 -------
 63800
31900
 -------
382800 Farth.
```

Rule 4. But if it be required to reduce Numbers of a lower Denomination into a greater, in ſuch caſe you muſt divide the lower Denomination propounded, by ſo much as makes of that lower Denomination one Unite or Integer of the greater Denomination. As for Example.

In 1360 Shillings how many Pounds? and knowing that 20 Shillings of the lower Deno-

Denomination is contained in a Unite or Integer of the greater denomination of Pounds, I therefore divide the lower Denomination 1360 Shillings by 20, by cutting off the last Figure, and taking the half of the remaining figures, which half 68 is the Quotient of that Division by 20, and the Number of Pounds contained in 1360 Shillings, as was required.

136|0
68

Rule 5. But if the question so happen in *Reduction* that there may be a denomination or denominations between the Denomination given, and the Denomination required, then you may reduce your Denomination given by *Division* into the next superior or greater Denomination, and when it is so reduced, reduce it again into the next above that, and so until you have brought it into the Denomination required. As for Example.

Rule 6. Let it be demanded in 142080 farthings to know how many Pounds. First, I divide the given Number Farthings by 4, to bring them into Pence, because 1 Penny doth contain 4 Farthings, and the Quotient thereof will be 35520 Pence; then I divide 35520 Pence by 12, because 12 Pence make

make 1 Shilling, and the Quotient of that Division will be 2960 Shillings, and then I divide 2960 by 20, and the Quotient giveth 148 Pounds, which are equal in value to 142080 Farthings. According to the Example.

```
                 12          20        l.
4)  142080    (35520     (296|0     (148
    12....     24...      2.
    ------     -----     -----
      22        115        9
      20        108        8
    ------     -----     -----
       20        72       16
       20        72       16
     -----     -----     -----
        c8       00        0
        8
     -----
         0
```

Rule 7. When the Number given to be reduced doth consist of divers Denominations, as Pounds, Shillings, Pence and Farthings; Hundreds, Quarters, Pounds and Ounces, *&c.* Then you must reduce the highest or greater Denomination into the

the next inferior or lower, taking in the odd Numbers ſtanding in that Denomination which your greater Denomination is reduced to, then reduce that Sum into the next inferior Denomination, adding thereto the odd Numbers ſtanding in that Denomination, and ſo doing until you have brought the Number given into the Denomination required. As for Example.

137 : 16 : 07 : ½
20

2756 *Shillings.*
12

5519
2756

33079 *Pence.*
4

132318 *Farthings.*

Let it be required to Reduce 137 : 16 : 7 : ½, into Farthings. Firſt, I bring 137 Pounds into Shillings by multiplying by 20, and taking in the 16 Shillings, the Pro-

Product will be 2756 Shillings. Then I multiply 2756 Shillings by 12 to bring the Shillings into Pence, taking in the odd 7 Pence, and the Product will be 33079 Pence. Laſtly, I multiply 33079 by 4, to bring Pence into Farthings, taking in 2 for the odd half Penny, and the Product is 132318 Farthings, being equal in value with 137 : 16 : 7 : $\frac{1}{2}$, or the Number of Farthings contained in the whole Sum, as was required.

Rule 8. If in *Reduction* any do remain of a Diviſion, the Remainer is of the ſame Denomination as the Dividend is of.

There is a ſhorter way for reducing Pounds into Pence, and Pence into Pounds. As for Example.

Rule 9. Let it be required to know how many Pence is contained in 347 Pounds.

```
  347
  240
 -----
13880
694
 -----
83280
```

Now becauſe 20 Shillings is 1 Pound, and 12 Pence is 1 Shilling, therefore 12 times 20 which is 240, is the Number of Pence contained in 20 Shillings or 1 Pound, and if you multiply your Pounds 347 by 240, the Product thereof 83280 are the Number of Pence contained in the Sum

Sum of 347 Pounds, as was required.

Rule 10. It is required to know how many Groats are comprehended or contained in 263 Pounds, the way of reducing Pounds into Groats is not difficult, for multiply the Pounds by 20 to bring them into Shillings, and becauſe 1 Shilling doth contain 3 Groats, multiply thoſe Shillings by 3, and that Product ſhall be the Number of Groats in ſo many Pounds.

But there is a quicker and ſhorter way than this, which is thus. Becauſe 20 Shillings is 1 Pound, and 3 Groats is 1 Shilling, therefore 3 times 20 which is 60 is the Number of Groats in 20 or 1 Pound, and if you multiply the Number of Pounds 263 by 60, the Product will be 15870 the Number of Groats in 263 Pounds which is a ſhorter way than to reduce Pounds into Shillings, and Shillings into Pence by two Multiplications.

$$\begin{array}{r} 263 \\ 60 \\ \hline 15870 \end{array}$$

Rule 11. And if it were required to reduce Pence into Pounds, or Groats into Pounds. Divide by 240 for reducing Pence into Pounds, and by 60 for the reducing Groats into Pounds, and the Quotient ſhall be the Number of Pounds required.

Pence.

	Pence.		*Groats.*
240)	83280 (347	− 60)	15780 (263
	720..		120..
	1128		378
	960		360
	1680		180
	1680		180
	0		0

Rule 12. Let it be required to reduce 83280 Pence, and 15780 Groats into Pounds, for experience ſake, being the Products of the two laſt Examples. Divide 83280 Pence into Pounds by 240, the Number of Pence in 20 Shillings or one Pound, and the Quotient will be 347, the Number of Pounds as before, alſo divide 15780 Groats by 60, the Number of Groats contained in 20 Shillings or one Pound, and the Quotient thereof will be 263 Pounds as before, by which you diſcern the infallibility of both Rules, for dividing or multiplying by 240, to reduce Pence into Pounds, and Pounds into Pence, and

and by *60* for reducing Groats into Pounds and Pounds into Groats.

Rule 13. There are other Denominations of English Mony, besides Pounds, Shillings, Pence and Farthings. As the following Table doth shew.

Denominations.	*Value.* s.	d.
A Mark	13	04
An Angel	10	00
A Noble	*6*	08
A Crown	5	00
A Thirteen Pence half Penny	1	01 ½
A Nine Pence	00	09
A Four Pence half Penny	00	04
Pieces of	00	03
	00	02

Rule 14. Let it be required in 783 Nobles to know how many Marks, and Pounds at 20 *s.* By this Table you find the value of a Mark to be thirteen Shillings and four Pence, and the value of a Noble to be half a Mark, that is *6 s.* 8 *d.* and likewise *6 s.* 8 *d.* is one third of 20 Shillings, therefore 20 Shillings or 1 Pound doth contain 3 Marks, therefore to resolve the question,

double

```
      783
        2
     ----
3)   1566 (522
     15..
     ----
        6
        6
     ----
        6
        6
     ----
        0
```

double the Number of Nobles given 783, that is to ſay, multiply 783 by 2, and the Product 1566 will be the number of Marks contained, and becauſe 3 Marks, *viz* 3 times 6*s.* 8 *d.* is 20 Shillings, or 1 Pound, I therefore divide the Number of Marks 1566 by 3, and in the Quotient I do find 522, which tells me that in 1566 Marks there is 522 Pounds, therefore in 783 Nobles there is 1566 Marks, and 522 Pounds: which is the anſwer to the queſtion required.

Rule 15. In 768 Pounds, how many Marks and Nobles? this queſtion is but the reverſe of the laſt, for if you multiply your Pounds given by 3, the Product 1566 will be Marks, and the half of that Number will be 783, the Number of Nobles, as was required.

```
  522  Pounds.
    3
 ----
 1566  Marks.
  783  Nobles.
```

There-

Therefore in 522 Pounds there is contained 1566 Marks, and 783 Nobles, as was required.

Rule 16. In 538 Pounds it is required to know how many Angels and Crowns? By the foregoing Table you find the value of an Angel to be 10 Shillings, and of a Crown 5 Shillings; therefore because twice 10 Shillings is 20 Shillings, and twice 5 Shillings is 10 Shillings; therefore I multiply the Number of Pounds given 538 by 2, the Product thereof 1076 is so many Angels, and that Product 1076 multiplied again by 2, the Product thereof 2152 are the Number of Crowns. Therefore in 538*l.* there are contained 1076 Angels, and 2152 Crowns, as was required.

538	*Pounds.*
2	
——	
1076	*Angels.*
2	
——	
2152	*Crowns.*

Rule 17. In 2152 Crowns how many Angels and Pounds?

This is the reverse of the last Rule, and whereas there you multiplied, here you must divide by, which is taking the half of it, as for

2152	*Crowns.*
538	*Angels.*
1076	*Pounds.*

for experience ſake, the laſt Example of the laſt Rule, the half of 2152 Crowns is 1076 Angels, and the half of 1076 Angels is 538 Pounds ; as before 2152 Crowns make 1076 Angels and 538 Pounds, as was required.

Rule 18. In 294 Pounds it is required to know how many Nine Pences and Four Pence half Pennies.

```
        294
         20
      -----
       5880
         12
      -----
      11760
      5880
      -----
9)    70560    (7840   Nine Pences.
      63...    15680   Four Pence half
      -----                  (Pennies.
        75
        72
      -----
         36
         36
      -----
         00
```

For

For the resolving this question you must first reduce your Pounds into Shillings, then your Shillings into Pence by the seventh Rule, and the Product of the which in the Example you will find to be 70560, you must divide by 9 to bring them into Nine Pences, and the Quotient will give you 7840 which are Nine Pences, and the double thereof 15680, is the Number of Four Pence half Pennies, as was required.

Rule 19. In 15680 Four Pence half Pennies how many Nine Pences, Shillings, and Pounds?

This is the Reverse of the last Rule, and where in that you did multiply here you must divide, where you divided here you must multiply; there I have chosen the same Example for your better experience, which is thus resolved.

Because two 4 *d.* $\frac{1}{2}$ make 9 Pence therefore take the half of your given Number of Marks 15680, being 7840 Nine Pences. Then by multiplying 7840 by 9, I reduce them into Pence and the Product thereof is 70560 Pence, by the Instructions of the sixth Rule, and you will find the Product of shillings to be 5880 Shillings,

and

and the Pounds to be 294. So I find that 15680 Marks is 7840 Nobles, or in value 5880 Shillings, and 294 Pounds, as was required.

```
          15680  Marks.
           7840  Nine Pences.
              9
         ------   20
   12)    70560  (588|0  (294
          60...   4.
         -----   ----
          105     18
           96     18
         -----   ----
           96     08
           96      8
         -----   ----
           00     00
```

Rule 20. In 6748 Thirteen Pence half Pennies how many Pence, Shillings and Pounds.

You must first compute how many half Pence there are in 13 *d.* $\frac{1}{2}$, and you will find 27; therefore multiply 6748 by 27, and the Product 182196 will be all half pences, and the half thereof 91098 is so much

much, which divided by 12 the Quotient will give you 7591 Shillings and 6 pence remaining, 7591 Shillings divided by 20 gives 379 Pounds, and 11 Shillings remaining. So that I find 6748 thirteen pence half pennies are in value 379*l*.11*s*.6*d*. as was required.

```
      6748
        27
     -----
     47236
    13496
    ------
    182196      20
12)  91098    (7591   (379 : 11 : 06
     84···       6
     ---       ---
       70       15
       60       14
      ---      ---
      109       19
      108       18
      ---      ---
        18      11
        12
       ---
         6
```

Rule 21. In 436 *l.* 12 *s.* 9 *d.* how many pieces of 4 *d.* ½ *per* piece.

```
            436 : 12 : 09
              20
            ------
            8732
              12
           ------
           17473
           8732
          -------
          104793      Pieces.
      9)  209586    (23287
          18....
          ---
           29
           27
           ---
            25
            18
            ---
             78
             72
             ---
              66
              63
              ---
               3
```

By

By the ſeventh Rule reduce the given Number 436 : 12 : 09 into pence, and you will find the Product of pence to be as by the Example 104797 pence, which becauſe there is an odd half penny in 4 *d.* $\frac{1}{2}$ you muſt double to bring into half pence, and the Product then will be 209586 half pence, now by reaſon that in 4 *d.* $\frac{1}{2}$ there are 9 half pence, you muſt divide theſe Number of half pence 209586 by 9, as you ſee in the Example, and the Quotient will be 23287 pieces of 4 *d.* $\frac{1}{2}$, and of the Diviſion there doth remain 3 which doth ſignifie ſo many half pence over and above 23287 pieces of 4 *d.* $\frac{1}{2}$.

Rule 22. In 372 pounds how many pieces of 3 *d.* and 2 *d.* of each equal, that is what Number of 3 *d.* pieces, and what Number of 2 *d.* pieces will make up 372 pound, and the Numbers of each equal.

The way to reſolve this queſtion, and all other queſtions of this nature, is to add the pieces together, (into which the given Number is to be brought,) and to reduce the given Number into the ſame Denomination with their Sum, and to divide the given Number ſo reduced by their Sum, and the Quotient will give you the exact

Number of each piece, the ſame method being uſed in the Example foregoing, by which we find that 17856 three pences, and 17856 two pences are equal in value to 372 pounds.

```
       372            d.
       240             3
     -----             2
     14880           ---
      744              5
     -----
  5)  89280  17856
      5....
     ---
      39
      35
     ----
       42
       40
      ---
        28
        25
       ---
         30
         30
        ---
          •
```

Rule

Rule 23. In 3748 pieces of eight Dollers or Duccats at 4*s*. 7*d*. ½, how many pounds, shillings and pence?

3748 — 1 *Doller* 4 : 7 : ½
111 — 12

3748 — 55
3748 — 111
3748

416028 — 20
12) 208014)1733|4 (866 : 14 : 06
12 .... — 16

88 — 13
84 — 12

40 — 13
36 — 12

41 — 14
36

54
48

6

First bring one single Doller or 4*s.* 7*d.* ½, into the loweſt Denomination named, which is half pence, and it doth contain 111 half pence, by which I multiply my given Number of Dollers 3748, and the Product thereof is 416028 half pence, and by taking the half I reduce it into Pence, which is 208014, which by the ſixth Rule you may reduce into Shillings and Pounds. So I find 3748 Dollers, Duccats, or pieces of Eight at 4 *s.* 7 *d.* ½ are worth 866*l.* 14*s.* 06 *d.* Engliſh Mony, as was required.

Reduction of Averdupoize *Weight.*

Averdupoize Weight is uſed for all ſuch Goods and Commodities that are to be weighed, except Gold, Silver and Bread, which are weighed by *Troy* Weight.

For the Contents of the ſeveral Denominations of *Averdupoize* Weight, the Learner may find in the *Averdupoize* Table in the ſecond Chapter.

Rule 24. In 246 *C.* 3 *qu.* 16 *l.* It is required to know how many Ounces?

In the *Averdupoize* Table in the ſecond Chapter I find 4 Quarter is one Hundred, therefore having ſet down the given Number

ber as in the Margent, 246 *C.* 3 *qu.* 16 *l.* and multiply the hundreds by 4, taking in the Quarters, and the Product 987 is ſo many Quarters. Likewiſe in the ſaid Table I find that 28 Pound makes one Quarter, therefore I multiply that Product 987 by 28, and the Product thereof muſt be 27652, not forgetting in the multiplication by 28, to take in the odd pounds I likewiſe find in the Table that 16 Ounces makes one Pound: therefore I multiply the laſt Product of Pounds 27652 by 16 to bring them into Ounces, and I find the Product to be 442432, where I do conclude that in 246: 3: 16 there is 442432 Ounces contained, as was required.

```
246 : 3 : 16
  4
———
987
 28
———
7902
1975
————
27652
   16
—————
165912
27652
——————
442432
```

Rule 25. In 442432 Ounces, how many Hundreds, Quarters and Pounds?

```
                  28        4
16)  442432   (27652   (987   (246
     32...     252..    8..
     ----      ----     ---
     122       245      18
     112       224      16
     ----      ----     ---
      104       212      27
       96       196      24
      ----     ----     ---
        83       16       3
        80
       ----
        32
        32
       ----
         0
```

This is no more but the reverse of the last Rule, for where in that question you did multiply, here you must divide, and by the same Figures, as the foregoing Example doth illustrate, in this manner.

First, you see the given Number of Ounces divided by 16, the quotient gives

27652

27652 for Pounds, next I divide 27652 Pounds by 28, the quotient gives me 987 quarters, there remaining of that Division 16 Pounds, next I divide 987 quarters by 4, and the quotient thereof is 246 hundred weight, and of that Division there remains 3 which are quarters, by which work I find that 442432 Ounces is as much as 27652 pound, 987 quarters, and 16 pound; or which is all one but more Arithmetically expressed, 246 *C.* 3 *qu.* 16 *l.* as was required, perfectly agreeing with the given number of the last Rule, by which you clearly understand the infallibility of the method or manner of working.

Rule 26. A person is to send to his Chapmen in the Country 93 parcels of Tobacco of 12 Pound in a parcel, as many parcels of 8 pounds in a parcel, as many of 6 pound parcels, and as many of 4 pound parcels. The question is how many hundred weight, quarters and pounds must be weighed off of the said Tobacco to comply with all these parcels?

First set down the several parcels one under another, as 12 pound, 8 pound, 6 pound, and 4 pound, the Sum whereof is 30 pounds; now because there is to be

93 of each parcel, I therefore multiply 93 by their Sum which is 30, the Product thereof gives me 2790 for the whole quantity of pounds. Now by the directions of the last Rule I divide that Number of pounds 2790 by 28, the quotient gives me 99 quarters, and 18 pounds remaining, next I divide these quarters 99 by 4, and the quotient gives me 24 hundred, and there remains 3 quarters. So by this work I find the whole quantity doth contain, as by the foregoing Example doth appear 24 *C.* 3 *qu.* 18 *l.* as was required.

	93			*Parcels.*
	30			*l.*
	———	4	*C. qu. l.*	12
28)	2790	(99	(24 3 18	8
	252	8		6
	———	———		4
	270	19		———
	252	16		30
	———	———		
	18	3		

Rule 27. A Chapman buyeth 24 : 3 : 18 of Tobacco, and orders it to be made up into parcels of 12 Pound, of 8 pound, of

of 6 pound, and of 4 pound, and there muſt not be more of one parcel than another, but all equal. I deſire to know how many muſt there be of each parcel.

```
      C.  qrs. l.
      24 : 3 : 18                 12
       4                           8
      ----                         6
      99                           4
      28                          ----
      ----                        30
      800
     199
     ----
30)  2790  (93
     270
     ----
       90
       90
      ----
        0
```

This is the reverſe of the laſt, therefore I have taken the anſwer of that queſtion, and make it here the queſtion upon which I deſire the anſwer, which anſwer will come out the ſame as the queſtion of the laſt

last, if the work be truly done, else not.

The way to resolve this question is thus: Reduce your given Number into pounds by the twenty fourth Rule, and the Product will be 2790 pounds. Next add all your parcels together, as 12 pounds, 8 pounds, 6 pounds, and 4 pounds, and they make 30 pounds: now divide your Number of pounds before found 2790 by 30, the Sum of all the parcels added together, and the quotient gives me 93, by which I find there must be 93 of each parcel, as was required, and agreeing with the question of the last Rule.

Reduction of Troy *Weight*.

Troy Weight differs much from *Averdupoize* Weight, as by the said Table in the second Chapter, where you will find but 12 ounces *Troy* Weight to be in a pound; therefore I would have the Learner well experienced in the Table of *Troy* Weight.

Rule 28. In 243 *l.* 8 *oz.* 16 *p. weight*, how many grains.

By the Table of *Troy* Weight in the second Chapter you will find 24 Grains makes 1 Penny weight, 20 Penny weights is

is 1 Ounce, and 12 Ounces one Pound. Therefore to reduce the given Number 243*l.* 8 *oz.* 16 *p.weig.* into grains I do thus. First, multiply the pounds 243 by 12, and take in the odd 8 ounces, and the Product gives you 2924 for ounces. Then multiply the ounces 2924 by 20, and take in the odd 16 penny weights, and the Product will give you 58496 for penny weights, Next multiply the penny weights 58496 by 24, the Product will give you 1403904 which are grains, by which I find that 243 *l.* 8 *oz.* 16 *p.weig.* do contain 1403904 grains, as was required.

l.	*oz.*	*p.w.*
243 :	8 :	16
12		
494		
243		
2924		
20		
58496		
24		
233984		
116992		
1403904 *Grains.*		

Rule 29. In 1403904 grains how many pounds, ounces and penny weights?

```
                  20          12         l.  oz.p.w
24) 1403904 (5849|6  (2924  (243: 8: 16
    120...      4..     24.
    ------     ----    ----
     203        18      52
     192        18      48
    ------     ----    ----
     119        04      44
      96         4      36
    ------     ----    ----
     230        09       8
     216         8
    ------     ----
     144        16
     144
    ------
       0
```

This is no more but the inverſe of the laſt Example, and is reſolved by dividing here by the ſame numbers that there you multiplied by, which is taken backwards by 24, 20, and by 12, and the anſwer will be 243 *l.* 8 *oz.* 16 *p. weig.* as was required.

Reduction

Reduction of Apothecaries Weights.

It will be requiſite for the Learner to make himſelf acquainted with the ſeveral Denominations, and the notes or marks thereof, uſed by Apothecaries, Chirurgions and Doctors; which by the ſaid Table in the ſecond Chapter are theſe following.

20 Grains is 1 Scruple ℈.
3 Scruples is 1 Drachm ʒ.
8 Drachms 1 Ounce ℥.
12 Ounces 1 Pound ℔.

The Learner getting theſe notes without Book readily to know them will be capable of reading any Doctors or Apothecaries bill.

Rule 30. In 18 ℔. 9 ℥. 2 ʒ. 1 ℈. it is required to know how many Grains?

Which to interpret is thus, read in 18 pound, 9 ounces, 2 drachms and 1 ſcruple how many grains? Therefore you muſt multiply 18 the Pounds by 12, and take in the 9 ounces, the Product will give 225 for ounces. Then multiply thoſe ounces 225 by 8 the Product will give 1802 for Drachms.

Drachms, then multiply theſe Drachms by 3, and the Product gives 5407 for Scruples. Next multiply thoſe Scruples by 20, the Product gives you 108140 for Grains, as was required.

℔.	℥.	ʒ.	℈.
18	9	2	1

12

45
18

225 *Ounces.*
8

1802 *Drachms.*
3

5407 *Scruples.*
20

108140 *Grains.*

Reduction of Wine Meaſure.

Rule 31. In 36 Tun of Wine how many Gallons?

Mul-

Multiply by 4 and the Product is 144, then multiply 144 by 63, and the Product gives you 9072 Gallons, being so many contained in 36 Tun of Wine, as was required.

$$\begin{array}{r} 36 \\ 4 \\ \hline 144 \\ 63 \\ \hline 432 \\ 864 \\ \hline 9072 \end{array}$$

But there is a shorter way to reduce Tuns into Gallons, which is this. There is in a Tun 4 times 63 Gallons, *viz.* 252 Gallons in a Tun, therefore multiply 36 by 252, or 252 by 36, the Product will be 9072 Gallons as before.

$$\begin{array}{r} 36 \\ 252 \\ \hline 1512 \\ 756 \\ \hline 9072 \end{array}$$

Rule 32. In 68 Tun how many Runlets? at 14 Gallons *per* Runlet.

Reduce

```
        252
         68
      -----
       2018
      1512
      -----
14)  17136  (1224
     14...
     ---
      31
      28
     ---
       33
       28
      ---
        56
        56
      ---
         0
```

Reduce your Tuns into Gallons by multiplying the Tuns by 252, or 252 by the number of Tuns given 68, and the Product will give you how many Gallons are contained in 68 Tun, which if you divide by 14 the Number of Gallons in a Runlet, the Quotient 1224 is the answer, and so many Runlets of 14 Gallons will there be in 68 Tun, as was required.

Reduction of Beer Measure.

Rule 32. In 54 Barrels of Beer how many Gallons and Quarts?

If you examine the Table of Beer Measure in the second Chapter you will find a Barrel

Barrel of Beer to contain 36 Gallons, and one Gallon 4 Quarts; therefore multiply your Barrels given 54 by 36, the Product thereof gives you 1944 Gallons, which multiplied by 4 gives you 7776 quarts, which are contained in 54 Barrels of Beer, as was required.

```
 54
 36
----
 324
162
----
1944  Gallons.
   4
----
7776  Quarts.
```

Rule 33. In 48 Kilderkins how many Gallons and Pints.

In the Table you will find that 9 Gallons is a Firkin, and 2 Firkins which is 18 Gallons is 1 Kilderkin; therefore multiply Kilderkins 48 by 18 and the Product will give you 864 Gallons. Now by the same Table I find 2 Pints is 1 Quart, 2 Quarts or 4 Pints 1 Pottle, and 2 Pottles or 8 Pints is 1 Gallon; therefore I multiply the Gallons 864 by 8 and there doth remain in the Product 6912 Pints, which are contained in

```
  48
  18
----
 384
 48
----
 864  Gallons.
   8
----
6912  Pints.
```

in 48 Kilderkins of Beer, as was required.

Reduction of dry Measure.

Rule 34. In 72 Last of Corn how many Bushels and Pecks.

Because in the Table of dry Measure in the second Chapter you find 5 Quarters make a Wey, and 2 Wey 1 Last; therefore I double the given number of Lasts 72, and make it 144, which I multiply by 5, and the Product is 720. There is a shorter way of reducing Lasts into Weys thus: 5 quarter being 1 Wey, 2 Wey or 10 Quarters is 1 Last; so that multiplying 72 Last by 10, by adding thereto 0 makes 720 Quarters, as before. Now by the said Table I find that 8 Bushels is 1 Quarter; I therefore multiply 720 Quarters by 8, and the Product gives me 5760 Bushels, and multiplying these 5760 Bushels by 4, the Product gives me 23040 Pecks, and so many Bushels and Pecks are contained in 72 Last of Corn, as was required.

$$
\begin{array}{r}
72 \\
144 \\
5 \\
\hline
720 \\
8 \\
\hline
5760 \\
4 \\
\hline
23040
\end{array}
$$

Reduction

Reduction of Long Meaſure.

Rule 35. I demand how many Yards, Feet, Inches and Barly Corns will reach from *London* to S. *Davids*, which is reckoned 202 Miles.

Here I multiply 202 Miles by 8 to bring them into Furlongs, and the product gives me 1616 Furlongs; then I multiply theſe Furlongs by 40 to bring them into poles, and they produce 64640 poles or perches. Then I multiply them poles by 11, and the product gives me 711040 half Yards.

The half whereof 355520 are Yards, which Yards I reduce into Feet by multiplying them by 3, and the product gives 1066560 Feet, then thoſe Feet I reduce into Inches by multiplying them by 12, and the product gives 12798720 Inches. Laſtly, I multiply thoſe inches by 3, and the product thereof gives 38396160 Barly Corns.

202 *Miles.*
8

1616 *Furlongs.*
40

64640 *Poles.*
11

64640
64640

711040 $\frac{1}{2}$ *Yards.*
355520 *Yards.*
3

1066560 *Feet.*
12

2133120
1066560

12798720 *Inches.*
3

38396160 *Barly Corns.*

Rule

Rule 36. The greateſt Circumference of the Globe of the Earth and Sea as all other greater Circles are, are divided into 360 Degrees, each Degree into 60 Minutes or Miles.

360	
60	
21600	*Miles.*
8	
172800	*Furlongs.*
40	
6912000	*Poles.*
11	
6912000	
6912000	
2) 76032000	*half Yards.*
38016000	*Yards.*
3	
114048000	*Feet.*
12	
228096000	
114048000	
1368576000	*Inches.*
3	
4105728000	*Barly Corns.*

Greateſt

Greateſt Circumference in Inches	1368576000
Earths Diameter in Inches	435456000
Earths Semidiameter in Inches.	217728000

Reduction of Cloth Meaſure.

Rule 37. In 348 Yards how many quarters and nalls?

$$
\begin{array}{rl}
348 & \textit{Yards.} \\
4 & \\
\hline
1392 & \textit{Quarters.} \\
4 & \\
\hline
5568 &
\end{array}
$$

Rule

Rule 38.
In 3462 Ells English, how many Ells Flemish?

```
      3462
         5
   -------
3) 17310 (5770 Ells Fl.
   15...
   ---
    23
    21
    --
     21
     21
     --
      00
```

Rule 39.
In 5770 Ells Flemish, how many Ells English?

```
      5770 (
         3
   -------
5) 17310 (3462 Ells En.
   15
   --
    23
    20
    --
     31
     30
     --
      10
      10
```

This is the Reverſe of the laſt Rule, but there is a ſhorter way than this to reduce Flemiſh Ells into Engliſh Ells, by multiplying the number of Flemiſh Ells given by *6*, and from the Product cut off the laſt Figure towards the right hand, and the Remainer ſhall give you the number of Engliſh Ells.

Example.

Let it be required to reduce *678* Flemiſh into Engliſh, I multiply *678* by *6*, and the Product is 4068, then I cut off the laſt Figure towards the right, which is 8, and there remains 406, which is the true number of Engliſh Ells, and the half of 8 being 4, gives you four fifths of an Engliſh Ell, which is the ſame as eight tenths. Therefore

678
6
406|8
4

678 Ells Flemiſh containeth 406 Ells Engliſh, and $\frac{4}{5}$ of an Ell, as was required.

The

CHAP. VII.

The Single Rule of Three Direct.

THe *Rule of Three* is ſometimes called *Golden Rule* by reaſon of the great excellency of it, it being the chiefeſt Rule in *Arithmetick*, becauſe the other Rules do make uſe of the *Rule of Three.*

This Rule doth teach to find out a fourth Proportional to three given numbers, in ſuch manner that the fourth may be in proportion to the third given Number, as the ſecond is to the firſt; for which reaſon it is alſo called the Rule of Proportion.

Now Proportion is thus to be underſtood, that is when the firſt given Number containeth or is contained by the ſecond, as often as the third containeth or is contained by the fourth, as you may ſee by theſe following Numbers.

As	is to	So is	to
3	6	4	8
2	8	3	12
4	20	7	35

These Numbers are all proportional, *viz.* as 3 is to *6*, so is 4 to 8; Likewise as 2 is to 8, so is 3 to 12; and as 4 is to 20, so is 7 to 35: That is to say, as many times as 3 is contained in *6*, so many times is 4 contained in 8: again, as often as 8 doth contain 2, so often doth 12 contain 3, *&c.*

The great difficulty is to know which of these three given Numbers are to be placed in the first place, which in the second, and which in the third. Now of these three given Numbers, there will be two of the said given Numbers of one Denomination, and the other is of the same Denomination as the fourth Number to be found will be of. Now when you have found out the two Numbers of one Denomination, put one in the first place, and the other in the third place, and in the second place set the Number which is the same Denomination with the fourth Number sought.

But perhaps it may be objected, that which of the two given Numbers of one deno-

denomination muſt be put in the firſt place, and which in the third place. Now you muſt underſtand that upon one of theſe two Numbers there is a demand, and that Number upon which the demand is placed, muſt be always eſteemed the third place; as in the following Example. If 3 Yards are worth 9 *s.* what ſhall 6 Yards be worth? here you ſee a demand made upon 6 Yards, for it is demanded what ſhall 6 Yards be worth? therefore 6 Yards muſt be in the third place, and 3 Yards in the firſt place, and then by conſequence the number 9 muſt be in the ſecond place, and they will ſtand in order thus.

Yards.	*Shillings.*	*Yards.*
3	9	6

Now you have prepared your Numbers as to order in ſtanding, for the finding out the fourth Number, obſerve this Rule.

Rule.

Multiply your ſecond and third Number together, and divide by your firſt, the Quotient is the fourth Proportional or Number ſought.

Yards	*Shill.*	*Yards.*	*Shil.*
3	9	6	18

```
     9
     6
   ----
3) 54 (18 Shillings.
   3
   ----
   24
   24
   ----
    0
```

Having placed my given numbers according to the former directions, as you see, I multiply the second number 9 by my third number 6, the Product will be 54 which by the fifth Chapter I do divide by the first number 3, and the Quotient giveth 18 for so many Shillings, because the second number was Shillings. So 18 Shillings is the price of 6 Yards, being the fourth Proportional number, for the fourth number 18 doth contain the third number 6, as many times as the second number 9 doth contain the first number 3.

Therefore if 3 Yards cost 9 Shillings, 6 Yards will cost 18 Shillings.

Quest.

Quest. 2. If 8 *C.* of Sugar cost 32 Pound, what will 27 *C.* of the same Sugar cost?

To observe the former Rules in placing the given numbers, I consider that the demand is made upon 27 *C.* of Sugar, which must be the third number; next I consider 8 *C.* to be of the same Denomination, therefore I put that in the first place, and by consequence I put 32 Pounds in the second place, being of the same Denomination as that number which is sought, as you see in the following Example.

Next I proceed and multiply according to the instructions before given, *viz.* 32 by 27, and the Product thereof will be 864, which I likewise divide by the first number 8, and the Quotient will give 108 for the true value 27 of *C.* of Sugar, as was required, at the rate of 32 Pound for 8 *C.*

C.	l.	C.
8	32	27
	27	
	224	
	64	
8)	864	(108
	8..	
	064	
	64	
	0	

Now if any thing do remain after you have divided the Product of the Multiplication of the second and third number by the first number, the remainder of your Division must be multiplied by the number of Units of the next lesser Denomination as are equal to a Unite or Integer of the second number in the question, the Product of this Multiplication divide by the first number in your question, and the quotient of this Division shall be the same denomination as the parts by which you last multiplied, and part of the fourth number sought, and if any thing remain of this Division, multiply such remainer by the parts of the next inferior denomination equal to a unite of the last quotient, and divide the Product by the same Divisor, and this Quotient shall be of the same denomination as your last multiplier, and so proceed either till nothing remain of your division, or till you have reduced your remainer into your lowest denomination.

Quest. 3. If 17 *C.* of Tobacco cost 43 Pounds, what will 86 Pound cost?

By the following Example you will find according to the former Instructions the numbers, and also multiplied and divided, the Quotient of the Division gives 217 *l.* because

becauſe the ſecond number is Pounds, but there remains 9, by which I underſtand the price or value of 86 C. of Tobacco to be ſomething more than 217 *l.* and to know how much more I proceed according to the foregoing Inſtructions.

As by this Example, *viz.* I multiply the Remainer 9 by 20, becauſe 20 Shillings is equal to an Integer of the ſecond number, the Product of this Multiplication is 180, which I divide by the firſt number 17, and the Quotient is 10 Shilling, becauſe the laſt Multiplier was of the Denomination of Shillings. But here yet doth remain 10, which I multiply by 12 Pence becauſe the laſt quotient was Shillings, and the Product of that Multiplication is 120, which I divide by 17 the firſt number, and the quotient is 7 Pence, becauſe the laſt Multiplier was Pence. But here yet doth remain 1, which if I multiply by 4, cannot be divided by 17, therefore I ſet it next after the Pence, and over the Diviſor with a Line between thus, $\frac{1}{17}$. By which I do find that 86 C. of Tobacco will coſt 217 *l.* 10 *s.* 7 *d.* $\frac{1}{17}$, if 17 C. coſt 43 *l.* which Fraction is one ſeventeenth of a Penny, which is an exact anſwer to the queſtion propounded.

17 C. 43 l. 86 C.

```
            43
            86
          ----
           258
          344
          ----
   17)    3698  (217
          34..
          ----
           29
           17
          ----
           128
           119
          ----
             9
            20
          ----
   17)     180  (10
           17.
          ----
            10
            12
          ----
   17)     120   7 : 1/17
           119
          ----
             1
```

Facit 217 *l.* 10 *s.* 7 *d.* $\frac{1}{17}$.

Another

Another Example of this kind will not be amiſs, wherein the ſecond number will be of another kind, as Weight.

Qu-ſt. 4. If 32 Pound buy 53 Hundred Weight of Sugar, how much will 124 Pound buy.

As you may diſcern by the enſuing Example. I have placed the numbers according to the former Inſtructions, and likewiſe multiplied the ſecond and third numbers together, and divided by the firſt number, of which Diviſion there doth remain 12, and the Quotient is 205 *C.* weights, becauſe the ſecond number is of that denomination, *viz.* Hundred weights, now becauſe there doth remain 12, I underſtand thereby I can buy more than 205 Hundred weight of Sugar for 124 Pound; which to find out I thus proceed according to the former Inſtructions, *viz.* I multiply the remainer by 4, becauſe the ſecond number is Hundred weights, and 4 Quarters makes one Hundred weight, and the Product is 48, which I divide by 32 the firſt number, and the Quotient will be 1 Quarter, becauſe the Multiplier was ſo; but of this Diviſion there doth remain 16. Next I multiply that remainer by 28 Pound, being the laſt quotient

l.	*C.*	*l.*
32	53	124

```
            124
             53
          -----
            372
           620
          -----
  32)      6572  (205
           34..
          -----
            172
            160
          -----
*Remains*    12
*Multiply*    4
          -----
  32)        48  (1
             32
          -----
*Remains*    16
*Multiply*   28
          -----
            128
            32
          -----
  32)       448   14
            32
          -----
            128
            128
          -----
              0
```

Facit 205 *C.* 1 *qu.* 14 *l.*

Quotient was Quarters, and 28 Pounds make 1 Quarter, and the Product of this last Multiplication will be 448, which I divide by 32, and the Quotient giveth 14 Pounds, because the last Multiplier was Pounds, but of this last Division there doth remain nothing. Finding by the Operation that for 124 Pound I can buy 205 *C.* 1 *qu.* 14 *l.* if 53 Hundred weight cost 32 Pound, being the answer to the Question propounded.

It many times falleth out in questions of the *Rule of Three*, that notwithstanding the first and third numbers are of one Kind or Species, *viz.* Mony, Weight, Measure, *&c.* yet they may either or both consist of several denominations, in such case you are to reduce both numbers into the lowest denomination, and likewise into one denomination; also if your second number be of several denominations, you must reduce it into the lowest denomination named, or lower if you please; which being done, then multiply the second and third number together, and divide by the first, according to the former directions, the answer to the question being of the same denomination as your second number is reduced unto.

Quest.

Quest. 5. If 12 *C.* 3 *qu.* of Sugar cost 32*l.* 14 *s.* 6 *d.* what will 82 *C.* 1 *qu.* 22*l.* cost?

Having placed these several numbers in their several respective places, according to the former instructions, as you see in the following Example, 12 *C.* 3 *qu.* being in the first place, 32 *l.* 14 *s.* 6 *d.* in the second place, and 82 *C.* 1 *qu.* 22 *l.* in the third place.

Now I perceive my first and third numbers are of several denominations, my first number having two denominations, as Hundreds and Quarters, *viz.* 12 *C.* 3 *qu.* My third number hath three denominations, as Hundreds, Quarters and Pounds, *viz.* 82 *C.* 1 *qu.* 22 *l.* But yet the first and third numbers are of one kind, that is to say, their several denominations are of Weight. Now the first and third number must be both of them brought into one denomination, and that denomination must be the lowest named either in the first or third number, which here in this Example is Pounds weight. Now by the sixth Chapter for the Reduction of *Averdupoize* weight, you may reduce the first and third numbers into Pounds weight, the first number producing 1428*l.* weight, and the third number produceth 9234 *l.* weight. Next

Next I consider the nature and quality of the second number which is Mony; but it likewise doth consist of several denominations, as Pounds, Shillings and Pence, *viz.* 32 *l.* 14 *s.* 6 *d.* which by the sixth Chapter of Reduction of Mony, must be reduced into Pence, being the lowest denomination named, and it will produce 7854 Pence.

Having thus reduced the three given numbers, as you see in the following Example, I proceed according to the former Instructions of this Chapter, multiplying the second number reduced 7854 by the third number reduced 9234, the Product of which Multiplication is 72523836, which I do divide by the first number reduced 1428 by the instructions of the fifth Chapter, and the Quotient maketh 50787, which are Pence, because the second number 7854 by Reduction was made Pence, which Quotient 50787 is the fourth Proportional required, and the number of Pence answering to the Question, which by Reduction makes 211 *l.* 12 *s.* 3 *d.* And so much will 82 *C.* 1 *qu* 22 *l.* cost, if 12 *C.* 3 *qu.* cost 32 *l.* 14 *s.* 6 *d.* as was required.

12 C.

C.	qu.	l.	s.	d.	C.	qu.	l.
12	: 3	32	: 14	: 06	82	1	22
4		20			4		
~~51~~		654			329		
28		12			28		
408		1314			2634		
102		654			660		
1428		7854			9234		
		9234					
		31416					
		23562					
		15708					
		70686					

```
                                 10      20
1428) 72523836   (50787 (423|2 (211
      7140···     48···   4··
      ---------------------------
      11238       27      02
       9996       24       2
      ---------------------------
      12423       38      03
      11424       36       2
      ---------------------------
       9996       27      12
       9996       24
      ---------------------------
                   3
```

Facit 211 *l.* 12 *s.* 3 *d.*

To

To prove the *Rule of Three* is to ſtate the Queſtion quite backward, by putting the fourth number found out, firſt, the third number put ſecond, and the ſecond number put third; ſo have you three new given numbers to find a fourth by the former Inſtructions, which fourth number when it is found will be the ſame as the firſt number in the queſtion firſt ſtated.

The Proof of the ſecond Queſtion of this whoſe fourth number ſo found is 108.

l.	C.	l.
108	27	32
	32	
	54	
	81	
108)	864	(8
	864	
	0	

Here you ſee the ſecond and thir dnumber multiplied together, whoſe Product 864

864 I do divide by the firſt number 108, and the quotient 8 is the fourth number found out, which is the firſt number in the Example of the ſecond queſtion.

But there is a ſhorter way of proving any queſtion in the *Rule of Three* thus.

Multiply the firſt number by the fourth number found; likewiſe multiply the ſecond number by the third; if theſe two Products do agree, your Operation is without any errour, elſe not, as you may ſee by the Proof of the Example of the ſecond queſtion.

8	32	27	108
	27		8
	224		864
	64		
	864		

By this you ſee that 8 the firſt nnmber, and 108 the fourth number multiplied together make 864, and the ſecond number 32 multiplied by the third number 27 produceth 864 as before.

The

The fifth Question proved both ways.

l. s. d. C. qu. l. l. s. d.

211:12:03 *buy* 82:1:22 *what will* 32:14:6

20 4 20

4232 329 654

12 28 12

8467 2634 1314

4232 660 654

50787 9234 7854

7854

36936

46170

73872

64638

28 4 C. qu.

50787) 72523836 (1428 (51 (12 : 3

50787··· 140 4

217368 28 11

203148 28 8

142203 0 3

101574

406296

406296

0

Facit 12 *C.* 3 *qu.*

1428	7854	9234	50787

```
7854          50787
9234           1428
-----        -------
   31416       406296
  23562       101574
 15708       203148
70686       50787
--------    --------
72523836    72523836
```

Here you multiply your first number 1428, and the fourth number found 50787 together, whose Product is 72523836; likewise multiply the second number 7854, and the third number 9234 together, and the Product is 72523836 as before.

CHAP.

CHAP. VIII.

The Single Rule of Three Backwards.

THIS Rule is ſo called, becauſe it produceth and requireth a proportion quite backward, and contrary to the Rule of Three Direct, becauſe in the Rule of Three Direct the greater the third number is, the greater will the fourth number be. But in this Rule the greater the third number is, the leſſer will the fourth number be: You are to place your three given numbers in order according to the Directions of the laſt Rule. But in this Rule you muſt multiply the firſt and ſecond numbers together, and the product of that Multiplication divide by the third number, and the number that cometh in the Quotient ſhall be the fourth number required, or anſwer to the Queſtion.

Queſt. 1. If 12 Labourers will build a Houſe in 28 days, how many days ſhall 16 men build ſuch another in.

Here I ſet the three given numbers in order

der, as you see in the following Example, where you

Men	Days	Men
12	28	16
	12	
	——	
	56	
	28	
	——	
16)	336	(21 days.
	32	
	——	
	16	
	16	
	——	
	0	

see 12 in the first place, 28 in the second place, 16 in the third place, and the first and third number both of one Denomination, and the fourth number required will be the same Denomination as the second number is of, according to the former Instructions of the last Chapter.

These numbers being thus placed and disposed as you see, multiply the first number 12 by the second number 28, and the

Product

Product thereof will be 336, which divide by 16 the third number, and the Quotient gives you 21 days for anſwer to the Queſtion as was required: For if 12 men can do the work in 28 days, 16 men will do it in 21 days.

Queſt. 2. If a Traveller performeth a Journey when the days are 12 hours long in 12 days, in how many days ſhall he perform the ſame Journey when the days are 15 hours long?

Here you may clearly perceive, the more hours are in a day, the fewer days will he be in performing his Journey, therefore ſet your numbers down as you ſee,

Hours	Days	Hours
10	12	15
	10	
15)	120	(8
	120	
	0	

Multiply the ſecond number 12 days, and the firſt number 10 hours together, and the product 120 divide by 15 hours the third number,

number, and the Quotient will give you 8 days, in anſwer to the Quotient as was required.

Queſt. 3. If I hang a room with 36 yards of ſtuff at 7 quarters wide, how many yards will hang the ſame Room at 4 quarters or yards wide.

Quarts	Yards	Quarts
7	36	4
	7	
4)	152	(63
	25	
	12	
	12	
	0	

Place the numbers as you ſee, and multiply the firſt and ſecond numbers together, the product thereof will be 252, which divide by the third number 4, and the Quotient will be 63 yards, and ſo many yards doth anſwer, or is equal to 36 yards of 7 quarters wide.

Queſt.

Quest. 4. If when the bushel of wheat is worth 3 *s.* a penny wheaten Loaf weigheth 8 ounces: I demand, how many ounces shall the same Loaf weigh, when the bushel is worth 5 shillings?

s.	oz.	s.	oz.
3	8	5	$4\frac{4}{5}$
	3		

$$\begin{array}{r} 5)\ 24\ (4\frac{4}{5} \\ 20 \\ \hline 4 \end{array}$$

Multiply the first and second numbers together, the product being 24 divide by 5 the third number, the Quotient will be 4 ounces $\frac{4}{5}$ of an ounce.

I might set down many Examples more of this Rule, but I suppose these may be sufficient for instruction sake.

The Rule of three Backward may be proved after this manner, multiply the first and second numbers together, and likewise the third and fourth numbers together. If the products of these two several multiplications do agree, the operation is right, else not.

12	28	16	21
	12		16
	56		126
	28		21
	336		336

Here is the first Example of this Rule proved by multiplying the first and second numbers, and the third and fourth numbers together, the products of each multiplication agreeing in one sum 336.

For proving of such questions, wherein after you have divided something doth remain, such Remainder must in proving the said question, be added to the Product of the third and fourth numbers, for the Product of the third and fourth numbers in such cases will fall out so much lesser than the Product of the first and second number, as there be Units remaining of the Division.

CHAP.

CHAP. IX.

The Double Rule of three Direct.

THE Rule of Three Double or Composed is so called, because it is a Composing or Joyning of two Questions of operations of the common Rule of Three into one, which doth much abbreviate Work.

And as in the Rule of Three there is the Direct Rule and the Backward Rule, so here also the two Questions may require a Direct or Reverse Proportion.

The Double Rule of Three being either Direct or Reverse, which is Backward.

In the Double Rule of Three Direct there are 5 numbers given to find out a sixth Proportional, which sixth Proportional may be found out by two single Questions of the Rule of Three Direct.

In these five given numbers of the Double Rule of Three Direct, are two Species or Kinds, first a supposition, secondly a Question or Demand.

The Suppoſition is contained in the three firſt of the five given numbers, the Demand in the two laſt.

The Queſtion being ſtated, the five numbers given muſt be diſpoſed in ſuch order as the firſt and the fourth may be of one Denomination, the ſecond and the fifth number of another Denomination, and the anſwer in the ſixth will be the ſame with the third, and then the manner of operation muſt be thus, multiply your firſt and ſecond numbers, the Product ſhall be the Diviſor, then multiply the other three numbers one by another, and the Product thereof ſhall be the Dividend.

Queſt. 1. If 100 *l.* in 12 months gain for Intereſt 7 *l.* what will 80 *l.* gain for 8 months?

In the following Example of this Queſtion you ſee the three firſt numbers, *viz.* 100 *l.* 12 months, and 7 *l.* do contain a ſuppoſition, and the two laſt, *viz.* 80 *l.* 8 months do contain a Demand or Queſtiſtion.

And theſe five numbers are ſo diſpoſed and placed, that the firſt number 100 *l.* and the fourth number 80 *l.* are of one kind or Denomination, *viz.* Money, the ſecond

ſecond number 12 months, and the fifth number 8 months, are both of another Denomination, *viz.* months, and the ſixth number required will be the ſame kind or ſpecies as the third number, *viz.* money.

Now according to the former Inſtructions of this Chapter, I multiply the firſt and ſecond numbers together, and their Product 1200 is the diviſor, then I multiply the three other numbers 7, 80, and 8 one by another as you ſee, whoſe Product cometh to 4480 for the Dividend, which divided by 1200 the Diviſor, the Quotient giveth 3 for ſo many pounds, becauſe the third number was pounds, but of this Diviſion there will remain 880, which I multiply by 20, and the Product giveth 7600 for a new Dividend, which divided by 1200, the Diviſor, the Quotient gives 14 ſhillings, but there yet doth remain 800, which multipled by 12 gives 9600 in the Product for another new Dividend, which divided by the former Diviſor 1200, the Quotient giveth 8 pence, as by the former Example, ſo the ſixth number found is 3 *l.* 14 *s.* 8 *d.* being of the ſame Kind or Species as the third number, *viz.* money,

 there-

l.	*Months.*	*l.*	*l.*	*Months.*
100	12	7	80	8

```
 12        80
100         8
----      ----
1200       640
             7
          ----
1200)     4480  (3
          3600
          ----
           880
            20
          -----
1200)    17600  (14
          1200
          -----
          5600
          4800
          ----
           800
            12
          ----
1200)     9600  (8
          9600
          ----
             0
```

	l.	*sh.*	*d.*
Facit—	3	14	08

therefore by the foregoing Operation 80 Pound for 8 Months will gain 3 *l.* 14 *s.* 8*d.* if 100 Pound for 12 Months gaineth 7 *l.* being the true anſwer to the queſtion, as was required.

This queſtion is done at two Operations by the *Rule of Three Direct*, but this is the quicker and ſhorter way by much.

First Operation.

If 100 *l.* gain 7, what will 80 *l*? anſwer 5 : 12 : 0.

Second Operation.

If 12 Months give 5 *l.* 12 *s.* what will 8 Months? anſwer 3 : 14 : 8.

This Example will be ſufficient for the explanation of this Rule, but to make it ſo plain, that the Learner may meet with nothing to obſtruct his cheerful proceeding in the Art of Arithmetick, I will exemplifie theſe two Operations, as followeth, according to the Rules and Inſtructions laid down in the ſeventh Chapter.

```
100        7      80
                   7
                 ---
          100)   560   (5 : 12
                 500
                 ---
                  60
                  20
---------------------------------
       100)    12,00   (12

   12         5 : 12          8
             20
            ----
             112
              12
            ----
             224
            112
            ----
            1344
               8
            ----     12      20
   12)     10752   (896    (74   (3
            96..     84.     60
---------------------------------
             115     56      14
             108     48
---------------------------------
              72      8
              72
             ---
               0
```

Here

Here you have the Work perſpicuous to the eye, performed by two ſingle queſtions in the *Rule of Three Direct*, exactly agreeing in the anſwer to the former way, which is a very great Argument to prove the infallibility of the former, which is much the quicker and ſhorter way.

CHAP. X.

The Double Rule of Three Backward.

IN all queſtions of this Rule you have five numbers always given, in diſpoſing of which numbers to their ſeveral proper places, obſerve the directions in the laſt Chapter, for this Rule is no other than the Reverſe of the laſt Rule, when the numbers are placed in order, the Solution of any queſtion at one Operation is thus.

Multiply your third and fourth numbers together, the Product thereof is your Diviſor, then multiply your firſt, ſecond and fifth numbers together, and their Product is your Dividend, which divide by your Diviſor, and the quotient is the ſixth num-

ber required, and anſwer to the queſtion propounded.

In the diſpoſing of the five given numbers you muſt always remember to make the third and fifth numbers of one and the ſame Kind or Species.

Queſt. 1. If 100 Pound in 12 Months gain 7 *l.* how much Mony in 8 Months will gain 3 : 14 : 8.

In the following Example of this queſtion you find the three firſt numbers, 100, 12 and 7 do contain a ſuppoſition of the queſtion, *viz.* ſuppoſe 100 *l.* in 12 months to gain 7 *l.* and the other two numbers 8 Months, and 3 : 14 : 8 contain the demand of the queſtion upon thoſe ſuppoſitions, *viz.* how much Mony in 8 Months will gain 3 : 14 : 8? which is according to the Inſtructions of the laſt Chapter.

And according to the Inſtructions of this Chapter, I have made the third number 7 *l.* and the fifth number 3 *l.* 14 *s.* 8 *d.* both of one Species or Kind, that is to ſay, they both do ſignifie Mony gained, although one of them doth contain three denominations, and the other but one.

Here

Here you must note that if any of the five numbers given are of different denominations, you must reduce all the numbers of the same Kind or Species into the lowest denomination named, as here in the following Example, the fifth number contains three denominations, *viz.* Pounds, Shil ings, Pence, as 3 : 14 : 8, therefore I do not only reduce that fifth number into Pence, but the rest of the five numbers, that are of the Species of Mony, 100 *l.* and 7 *l.* and afterwards I proceed according to Instruction, as by the following Example.

Example.

Example.

Pound.	Months.	Pound.	Months.	l.	s.	d.
100	12	7	8	3	14	8
20		20		20		
2000		140		74		
12		12		12		
24000		280		156		
		140		74		
		1680		896		
		8		12		
		13440		1792		
				896		
				10752		
				24000		
				43008000		
				21504		
				258048000		

```
                       12      20
13440) 258048000 (19200 (160|0 (80
       13440.....  12...   160 .  .
       ------------------------------
       123648       72     00
       120960       72
       ------       --     ----------
         26880       0
         26880
       ------------------------------
            0
```

The numbers given being orderly diſpoſed as you ſee, the next thing I find the firſt number, the third number, and the fifth number to be one of one Species, *viz.* Mony, but of different denominations, ſo I reduce them all three into the loweſt denomination named which is Pence, the firſt number being reduced into 24000 *d.* the third number into 1680 *d.* and the fifth number into 896 *d.* at which time the five numbers are 24000, 12, 1680, 8, 896. Then I proceed according to the foregoing Inſtructions of this Chapter, and multiply the third number 1680 by the fourth number 8, and the Product 13440 is the Diviſor. Next I multiply the fifth number 896 by the ſecond number 12, and the Product thereof is 10752, which I multiply again by the firſt number 24000, and the Product

duct thereof is 258048000 for the Dividend, which if you divide by the Divisor 13440, the Quotient will give you 19200*d.* for the sixth Proportional or answer to the Question propounded, which by *Reduction* you will find to be 80 *l.* which doth agree with the Question and Example of the last Chapter; the Question and Example of this Chapter being the Reverse of that Question and Example, and do prove one another, as you may perceive by their Examples.

This Question may also be resolved at two Operations, the first by the *Rule of Three Reverse*, the other by the *Rule of Three Direct.*

If 12 Months require 100 *l.* what will 8 Months? answer 150 *l.*

If 7 *l.* require 150*l.* Principle, what will 3 : 14 : 8 require Principle? Answer 80 *l.*

The first Operation by the Rule of 3 Reverse.

```
12 Mon.  100 l.     8
          12
        -----
8)      1200  (150
        8..
       -----
         40
         40
       -----
          0
```

The

The second Operation by the Rule of Three.

l.	l.	l. s. l.
7	150	3 : 14 : 8
20	20	20
140	3000	74
12	12	12
280	36000	156
140	896	74
1680	216000	896
	324000	
	288000	

		12	20	
1680)	32256000	(19200	(1600	(80
	1680····	12···	160·	
	15456	72	00	
	15120	72		
	3360	0		
	3360			
	0			

Here

Here you see the two Operations worked according to the Rule of Three Reverse in the first Operation, and according to the Rule of Three Direct in the second Operation, and they do produce the same answer as before, *viz.* 80.

And in like manner must you work in all other questions of this nature, supposing this question and Example sufficient to explain the meaning of this Rule.

CHAP. IX.

Reduction of Fractions.

BEFORE we treat of Reduction of Fractions, it will be convenient to shew the Learner what a Fraction is.

A Fraction or Broken Number is a part or many parts of any whole number, and it is usually expressed by two numbers in smaller figures, one above the other, with a little Line drawn between them, thus $\frac{1}{4}$ the figure or figures, standing above the Line, are called the Numerator, the other underneath

underneath the Line are called the Denominator, as by Example, 3 quarters is a Fraction, and must be thus expressed, whereof 3 standing above the Line, is called the Numerator, and 4 which stands under the Line is called the Denominator, it being always convenient that the Numerator be always less than the Denominator, for if the Numerator be either greater or equal to the Denominator, it is then an improper Fraction.

Reducing of Fractions are according to the several Heads following.

1. To Reduce a mixt number into an improper Fraction equal thereunto.

2. To Reduce a whole number into an improper Fraction.

3. To Reduce an improper Fraction into its equivalent whole (or mixt) number.

4. To Reduce any Fraction into his lowest equivalent term, to the Fraction given.

5. To find out the true value or worth of a Fraction in the known parts of Coyn, Weight, Measure, &c.

6. To Reduce Compound Fractions to a simple one of the same value.

7. To Reduce divers Fractions of several unequal Denominators, to Fractions of equal Denominators, and of the same value.

8. To Reduce a Fraction of one Denomination into another Fraction that is of the same value.

1. *To Reduce mixt Numbers to an improper Fraction.*

A mixt Number is composed of two Parts, or Numbers, whole and broken Integers and Fractions, the whole Numbers being composed of Integers, the broken being a Fraction annexed to the whole Number, as in the mixt Number $48\frac{12}{16}$, 48 is the whole number, and $\frac{12}{16}$ is the broken number, shewing that one *Integer* of 48 being divided into 16 parts, this $\frac{12}{16}$ doth signifie that there doth belong to 48, 12 of the 16 parts, the Rule is thus:

Multiply the whole number, by the Denominator of that Fraction annexed to him, and to the Product thereof, add the Numerator of the same Fraction, then set their sum, over the Denominator with a Line between them. And this new Fra-

ction,

ction, though improper, shall be equal to the mixt Number given.

Example.

Let the mixt Number before-mentioned 48, $\frac{1}{16}$ be required to be Reduced into an improper Fraction equal thereunto, multiply the whols Number 48 by the Denominator 16, and the Product is 768, to which add the Numerator 12, and they do make 780, which is so many sixteens, therefore I set down 780, and underneath 16, drawing a Line between them as you see which is an improper Fraction, but containing 780 sixteens is equal to the mixt number 48 $\frac{12}{16}$ as was required.

$$\begin{array}{r l}
48 & \frac{12}{16} \\
16 & \\
\hline
288 & \\
48 & \\
\hline
768 & \\
12 & \\
\hline\hline
780 &
\end{array}
\qquad \frac{780}{16}$$

2. *To Reduce a whole Number to an improper Fraction.*

Multiply the whole Number given by the intended Denominator, and place the Pro-

Product of the Multiplication over the Denominator, and draw a Line between.

Example.

Let it be required to Reduce the whole Number 24 into a Fraction whose Denominator is 8, multiply the whole Number 24 by 8, and the Product is 192, which I set over the Denominator 8, and draw a Line between, so 192 is the Numerator, and 8 the Denominator, making $\frac{192}{8}$ equal to 24 the whole Number.

$$\begin{array}{r} 24 \\ 8 \\ \hline 192 \end{array}$$

Facit $\frac{192}{8}$

3. *To Reduce an improper Fraction into a whole or mixt Number equivalent thereunto.*

Divide the Numerator by the Denominator, and the Quotient will give the whole Number equal thereunto, that is equal to the improper Fraction given; and if any thing remain make it the Numerator, and make the Divisor Denominator, as you may see in the following Example.

Ex-

Example.

Let it be required to Reduce the improper Fraction $\frac{357}{12}$ into a mixt Number equivalent thereunto, I divide the Numerator 357 by the Denominator 12, and the Quotient is 29, which is the whole Number, and there doth remain 9, which I make a Numerator, ſetting 12 the Diviſor underneath for a Denominator, ſo you have the mixt Number $29\frac{9}{12}$ equal to the improper Fraction $\frac{357}{12}$ as was deſired.

12) 357 (29
24
——
117
108
——
9

4. *To Reduce a Fraction into its loweſt terms equal thereunto.*

If the Numerator and Denominator of the Fraction propounded be even numbers. Take the half of either as often as you can, and if either Numerator or Denominator be odd numbers, or falleth out to be ſo in the halfing, then divide them by any number that will divide both Numerator and Denomi-

nominator without any thing remaining in either, and when you have thus brought both Numerator and Denominator as low as you can, then this new Fraction shall be equal to the given Fraction.

Example.

Let it be required to Reduce the given Fraction $\frac{192}{672}$ into the lowest terms. First I take the half of the Numerator 192,

192	96	48	24	12	6	2
672	336	168	84	42	21	7

which is 96. Likewise half the Denominator which is 336, so it is brought to $\frac{96}{336}$, then I take half the Numerator 96, which is 48, and half the Denominator 336 which is 168, and they two numbers make the Fraction $\frac{48}{168}$, and by the halfing $\frac{48}{168}$ I bring it to $\frac{24}{84}$ the half of which is $\frac{12}{42}$, and the half of that $\frac{6}{21}$, and because here the Denominator is an odd number 21, which will not admit of halfing, I try to divide them by 3, 4, 5, 6, &c. finding that 3 doth divide both the Numerator 6 and the Denominator

nominator 21 without any remains, bringing the Fraction to $\frac{2}{7}$ which is the lowest it can be brought, whereby I conclude $\frac{2}{7}$ to be as much or equivalent with $\frac{192}{672}$.

Another way of Abbreviation.

There is a more excellent and quicker way to Abbreviate or Reduce a Fraction into its lowest term, which is thus: First, divide the Denominator by his Numerator, and if any thing remain let your Divisor be divided by that number, and if any thing do still remain of this Division, divide your last Divisor by this last Remainder, and so do until 0 remain, and the Divisor of that last Division shall be the number which shall Abbreviate your Fraction by dividing both your Numerator and Denominator, and reduce them at once into the lowest terms.

Example.

It is required to Abbreviate $\frac{1152}{2592}$ into its lowest terms, by a certain number which shall divide both Numerator and Denominator, without any Remainder, the Quotient

ent of which Divisions shall give the Numerator and Denominator equivalent in the lowest terms.

Divide the Denominator 2592, by the Numerator 1152, and there will remain 288, therefore divide your Divisor 1152 by 288, and there will remain 0, the Divisor of this last Division was 288, which is the common number, by which if you divide the Numerator of your given Fraction 1152, the Quotient gives 4 for a new Numerator, by which I likewise do divide the Denominator 2592, and the Quotient gives 9 for a new Denominator, and 0 remains of either of these Divisions, whereby I find the new Fraction $\frac{4}{9}$ is the same in signification as $\frac{1152}{2592}$ being equivalent or equal thereunto in the lowest terms it can be reduced to, as was required.

Note.

If both Numerator and Denominator of any Fraction do end with a Cypher, or Cyphers, you may cast off as many Cyphers from one as from the other, and the remaining figure will give a Fraction of the same value as the given Fraction before was

of,

of, *Example* $\frac{200}{500}$ by cutting off the Cyphers will be reduced unto $\frac{2}{5}$ which signifieth as much in value as the given Fraction $\frac{200}{500}$.

V. *To find the value of any Fraction in the known parts of Coyn, Weight, Measure, &c.*

Multiply the Numerator by the number of Units in the next inferior Denomination equal to an Unit of the same Denomination, as the Fraction given divide the Product of that Multiplication by the Denominator, and the Quotient giveth the value in such parts as you did multiply by; but if any number doth remain, mulciply such remainder by the number of Units in the next inferior or lesser Denomination, and divide by your last Divisor, or Denominator of your given Fraction; do thus until you have 0 remaining, or until you have brought it as low as you can, and the several Quotients give the true value of the Fraction in several Denominations, and if any thing remain of the last Division, make it a Numerator over the same Denominator in your Fraction given.

Example.

It is required to know or find out the true value of $\frac{283}{487}$ of a Pound Sterling, the Fraction being given in a pound, the next inferior Denomination is ſhillings wherein 20 Units make an integer in pounds, therefore I multiply the Numerator of the given Fraction 283 by 20, the Product is *5660*, which divide by 487 the Denominator, and the Quotient gives me 11 ſhilling, but there doth remain of this Diviſion 303, which I multiply by 12 the number of Units in the next inferior Denomination, and the Product is *3636*, which I likewiſe divide by 487, and the Quotient gives me 7 pence, and there doth remain 227, which I multiply by 4 the number of Units in the next inferior Denomination, and the Product 1008 I divide by 487 as before, and the Quotient gives me 2 farthings, and there ſtill remains 34, which I put as a Numerator over the old Denominator 487, ſo I find the juſt value of $\frac{283}{487}$ of a pound ſterling is 11 *s.* 7 *d.* 2 *f.* $\frac{34}{487}$ as you may ſee by the ſucceeding work.

28

283

487
283
20

487) 5660 11)
487.

790
487

303
12

606
303

487) 3636 (7
3409

227
4

487) 1008 (2
974

34

Facit. 11 *s.* 7 *d.* 2 *f.* $\frac{14}{487}$.
12

6. To

VI. *To Reduce a Compound Fraction into a simple one of the same value.*

A Simple Fraction consists but of one Numerator and one Denominator; but a Compound Fraction doth consist of many Numerators, and as many Denominators $\frac{1}{3}$ of $\frac{5}{8}$ of $\frac{7}{16}$ of a pound Sterling is a Compound Fraction, because there are more Denominations than one represented in the Fraction.

When a Compound Fraction is given to be converted into a single Fraction, multiply all the Numerators together, and the Product thereof make a new Numerator, then Multiply all the Denominators together, and the Product thereof make a new Denominator, which new Numerator and Denominator shall be a Single or Simple Fraction and equal to the Compound Fraction given.

Example.

It is required to Reduce $\frac{9}{16}$ of $\frac{3}{9}$ of $\frac{5}{8}$ of $\frac{3}{4}$ into a single or simple Fraction. Multiply the several Numerators, 9, 3, 5, 3, one

one into another as you ſee, the Product thereof will be 405, which make your Numerator, then multiply all the Denominators in the ſame manner and their Product will be 4608 which make your Denominator. So have you the ſingle Fraction $\frac{405}{4608}$ equal to $\frac{9}{16}$ of $\frac{3}{9}$ of $\frac{5}{8}$ of $\frac{3}{4}$ as was required, whereby you may know the value of a Compound Fraction: Firſt by reducing the Compound Fractiou inɔo a ſimple one as you are here taught, then by the Inſtructions of the fifth Rule of this Chapter you may find its true value.

Numerators	*Denominators*
9	16
3	9
27	144
5	8
135	1152
3	4
405	4608

Facit. $\frac{405}{4608}$

VII. *To Reduce Fractions of unequal Denominators, into Fractions of the same value having equal Denominators.*

Multiply all the Denominators into one Sum, and the Product ſhall be the common Denominator, then multiply each Numerator into all the Denominators but his own, and the laſt Product put for a Numerator over the Denominator before found. And this new Fraction is equal to the Fraction whoſe Numerator you multiplied into the Denominators; do ſo by the reſt, and you have your deſire fulfilled.

Example.

Reduce $\frac{2}{5}$ $\frac{4}{7}$ $\frac{1}{8}$ and $\frac{7}{16}$ into a common Denomination; do thus,

Multiply the Denominators 5, 7, 8 and 16 into one Sum, which will be 4480 for a common Denominator. Then multiply the Numerator 2 into all the Denominators but his own, *viz.* into 7, 8, and 16, and the Product thereof 1792 will be a Numerator to the Denominator before found 4480, which new Fraction $\frac{1792}{4480}$ is equal to

to $\frac{2}{5}$ the first given Fraction, next proceed for a new Numerator to a second Fraction by taking the next Numerator, which is 4, and multiply him by all the Denominators, except his, that is by 5, 8 and 16, and the Product is 2560, which is a new Numerator unto the Denominator before found 4480, and the new Fraction $\frac{2560}{4480}$ is equal to the second given Fraction, *viz.* $\frac{4}{7}$. Likewise multiply the Numerator 3 by the Denominators 5, 7, and 16, the Product gives $\frac{1680}{4480}$ equal to the third given Fraction which is $\frac{3}{8}$, then multiply the last Numerator 7, by 5, 7 and 8, and the Product gives $\frac{1960}{4480}$ equal to $\frac{7}{16}$. So instead of $\frac{2}{5}$ $\frac{4}{7}$ $\frac{3}{8}$ and $\frac{7}{16}$, I have found $\frac{1792}{4480}$ $\frac{2560}{4480}$ $\frac{1680}{4480}$ and $\frac{1960}{4480}$ which have all equal Denominators, and each Fraction equal to his respective given Fraction as was required.

VIII. *To Reduce Fractions of one Denomination into another.*

Reduction of Fractions of one Denomination to another, is two-fold, *viz.* Ascending or Descending. Ascending when a Fraction is to be reduced from a lesser to a

greater Denomination, as Fractions of pence into Fractions of pounds; Descending when a Fraction of a greater Denomination is brought into a lesser, as Fractions of pounds into Fractions of pence.

A Fraction being given to be reduced from a lower Denomination to a greater Denomination, make of it a compound Fraction, by adjoining the parts of the several Denominations, between that and the Denomination you would reduce it to for Denominators, and a Unit for a Numerator, then by the 6th hereof reduce your Compound Fraction to a Simple one.

Example.

It is required to know what part of a pound $\frac{7}{9}$ of a farthing is?

To reduce this, you must make it a Compound Fraction, by considering that 1 farthing is $\frac{1}{4}$ of a penny, a penny is the $\frac{1}{12}$ of a shilling, and a shilling the $\frac{1}{20}$ of a pound, therefore $\frac{7}{9}$ of a farthing is $\frac{7}{9}$ of $\frac{1}{4}$ of $\frac{1}{12}$ of $\frac{1}{20}$, which by the 6th hereof, having already made a Compound Fraction of it, you may bring it to $\frac{7}{8640}$ of a pound as was required.

To

To reduce Fractions of a greater Denomination into a leſſer; you muſt multiply the given Numerator by the parts contained in the ſeveral denominations between the denomination your Fraction is of, and the denomination you would reduce it to, then place the Product over your given Denominator.

Example.

I would reduce $\frac{5}{8}$ of a pound to the Fraction of a farthing.

Multiply the Numerator 5 by 20, by 12 and 4 into one Sum, the Product is 4800, which put over the Denominator 8, and it makes $\frac{4800}{8}$ of a farthing equal to $\frac{5}{8}$ of a pound as was required.

And if the Fraction propounded to be reduced be in weight, you muſt then have reſpects to the parts contained in the ſeveral denominations of weight.

CHAP. XII.

Addition of Fractions.

ADdition of Fractions is the putting or joyning together of ſeveral broken numbers, thereby to make one principal Fraction of them all, and in this and the next, obſerve that all Fractions proper or improper, muſt be of one denomination, or by the former Rules muſt be reduced thereunto, and when you have ſo reduced them, add all the Numerators together, and ſubtract their total ſum for a new Numerator over the common Denominator.

Example.

It is required to know the ſum of $\frac{17}{36}$ $\frac{19}{36}$ $\frac{12}{36}$ $\frac{18}{36}$, here you have one common Denominator, which is *36*, and the ſum of Numerators, 17, *19*, 12, 18, is *66*, which put as a Numerator over the Denominator thus $\frac{66}{3}$, and by the former Rules of the laſt Chapter you may reduce them to the mixt number 1: $\frac{30}{36}$. But

But if the Fractions that are required to be added together be of unequal and different Denominators, bring them a common Denominator by the 7th Rule of the last Chapter, and having so reduced them follow the foregoing instructions.

CHAP. XIII.

Subtraction of Fractions.

THE instruction given in Addition of Fractions are likewise here to be followed in Subtraction of Fractions, in reducing the Fractions given to one Denomination, and before any Subtraction is to be made the Fractions must be reduced to a common Denominator, then deduct one Numerator from the other, and set the remainder over the common Denominator, which Fraction is the difference between the given Fractions.

Example.

It is required to subtract $\frac{3}{7}$ from $\frac{2}{9}$ by the 7th of the 11th Chapter, you may re-

duce the said given Fractions into a common Denominator, which will be $\frac{49}{63}$ and $\frac{27}{63}$, subtract the lesser Numerator 27 from the greater 49, and there will remain 22, which place over the Denominator 63 makes the Fraction $\frac{22}{63}$ which is the difference between the two given Fractions as was required.

Secondly, If you are to subtract a broken number from a whole number, you must borrow a Unit and convert it into a Fraction by making both Denominator and Numerator equal to the Denominator of the Fraction given, then take the lesser Numerator out of the greater, and place the remainder as a Numerator over the given Denominator, and for one you borrowed of the whole number, pay a Unit by subtracting a Unit from the whole number and the remainder set down before the Fraction found as before, and the mixt number is the remainer or difference between the two given Fractions, when they are taken one from the other.

Ex-

Example.

It is required to ſubtract $\frac{7}{16}$ from 12, here $\frac{7}{16}$ is a fraction or broken number, and 12 is the whole number, from which whole number I take a Unit and make a Fraction of, ſo the number is 11 $\frac{16}{16}$, then I deduct the Fraction $\frac{7}{16}$ from 11 $\frac{16}{16}$, taking the Numerator 7 out of the Numerator 16, and there remains 9, which I make a Numerator over the Denominator given 16, and ſet down 11 before the ſaid Fraction as you ſee, So ſhall the difference or remainer between the two given Fractions be 11 $\frac{9}{16}$ as was required.

$$\begin{array}{r} 11:\frac{16}{16} \\ -\ \frac{7}{16} \\ \hline 11:\frac{9}{16} \end{array}$$

Thirdly, If it be required to ſubtract a Fraction from a mixt number, or one mixt number from another, reduce the Fractions into a common Denominator by the 7th of the 11th, and when you have ſo done, if the Numerator of the Fraction to be ſubtracted, be leſs than the Numerator of the Fraction from whence you ſubtract, then take one from the other, and the remainer is the Numerator to that common Denominator, then ſubtract the leſs whole number from the greater, and that remainer with the Fracti-

on

on annexed, is the difference between the two given numbers.

Example.

It is required to subtract the mixt number $7\frac{1}{8}$ from the mixt number $9\frac{5}{9}$ by the 7th of the 11, the Fractions are reducted unto $\frac{27}{72}$ and $\frac{40}{72}$ therefore I subtract the Numerator of the number to be subtracted being lesser, *viz.* $\frac{27}{72}$ from $\frac{40}{72}$ and the remainer is 13 which I set over the common Denominator 72 as a Numerator. Likewise I subtract the whole number 7 from 9, and there remains 2, by which I find that the mixt number $2\frac{13}{72}$ is the remainer or difference between the two given mixt numbers $9\frac{5}{9}$ and $7\frac{1}{8}$ as was required.

$$\begin{array}{r} 9\frac{40}{72} \\ 7\frac{27}{72} \\ \hline 2\frac{13}{72} \end{array}$$

But if the Fraction to be subtracted be greater than the Fraction from which you are to subtract, reduce the Fractions as you were taught by 7th of the 11th into a common Denominator, then subtract the greatest Numerator from the common Denominator, add the remainer to the lesser Numerator, and their Sum make a new Numerator to the common Denominator, and carry

carry one to the whole number to be ſubtracted, and ſubtract it from the greater whole number, and the remainer with the Fraction annexed, being a mixt number, ſhall be the difference of the two mixt numbers given.

Example.

It is required to ſubtract $24\frac{1}{4}$ from $28\frac{2}{6}$. By the 7th of the 11th the Fraction $24\frac{1}{4}$ is reduced into $\frac{18}{24}$, and the other Fraction $28\frac{2}{6}$ into $\frac{8}{24}$; now becauſe the numerator 18 cannot be ſubtracted from 8, therefore I ſubtract the Numerator 18 from 24 the common Denominator, and there remains 6, which I add to the Numerator 8, and it makes 14, which makes a new Numerator to the common Denominator 24, then I carry 1 to the whole number 24, ſaying 25 from 28, and there remains 3, ſo the mixt number $3\frac{14}{24}$ is the remainer and difference between the two Fractions given $28\frac{2}{6}$ and $24\frac{1}{4}$ as was required.

$$
\begin{array}{rcr}
28\frac{2}{6} & — & 28\frac{8}{24} \\
24\frac{1}{4} & — & 24\frac{18}{24} \\
\hline
 & & 6 \\
 & & 8 \\
\hline
 & & 3\frac{14}{24}
\end{array}
$$

Fourthly, If you are to ſubtract Fraction

on of Fractions from Fraction of Fractions, that is one Compound Fraction from another, you must by the 6th of the 11. reduce the two Compound Fractions given into two Simple or Single Fractions, then by the 4th of the 11, you abbreviate those two Fractions, and by the first Example of this Chapter subrtact them.

Example.

Let it be required to subtract $\frac{2}{7}$ of $\frac{3}{16}$ of $\frac{5}{8}$ from $\frac{3}{8}$ of $\frac{5}{7}$ of $\frac{8}{12}$ by the 6th of the 11, you reduce $\frac{2}{7}$ of $\frac{3}{16}$ of $\frac{5}{8}$ into the Simple Fraction $\frac{30}{896}$, and $\frac{3}{8}$ of $\frac{5}{7}$ of $\frac{8}{12}$ into $\frac{120}{672}$, now these two single Fractions $\frac{30}{896}$ and $\frac{120}{672}$, which two Fractions by the 4th of the 11th you may abbreviate to $\frac{15}{448}$ and $\frac{60}{336}$, then by the 7th of the 11. reduce these two last Fractions into a common Denominator, and you will make the Fractions $\frac{26880}{161528}$ $\frac{5040}{161528}$ subtract the lesser Numerator 5040 out of the greater 26880, and there remains 21840, which put as a Numerator over the common Denominator, and you will have the Fraction $\frac{21840}{161528}$ which is the difference between the two Compound Fractions $\frac{2}{7}$ of $\frac{3}{16}$ of $\frac{5}{8}$ and $\frac{3}{8}$ of $\frac{5}{7}$ of $\frac{8}{12}$ as was required.

CHAP.

CHAP. XIV.

Muliplication of Fractions.

IF the Fractions you are to multiply are Simple Fractions, multiply the Denominators one by another, the Product is a new Denominator, alſo multiply the Numerators one by another, and their Product is a new Numerator, and this new Fraction is the Product of the Multiplication required.

Example.

It is required to multiply $\frac{2}{6}$ by $\frac{3}{8}$.

The Product of the two Denominators 6 and 8, multiplied together is 48, and the Product of the two Numerators 2 and 3 is 6, therefore the new Fraction $\frac{6}{48}$, which by abbreviation is $\frac{1}{8}$, is the Product of the two Fractions $\frac{2}{6}$ and $\frac{3}{8}$ multiplied one by another as was required.

If the given Fractions to be multiplied be mixt numbers, by the firſt of the 11th, you

you muſt firſt put either the whole number into his broken by reducing them into improper Fractions, and then multiply Numerator by Numerator, and Denominator by Denominator, their Products will give you a new Numerator and Denominator for a new Fraction, which new Fraction ſhall be the Product required, but this Fraction will be an improper Fraction, therefore if you divide the Numerator by the Denominator, the Quotient gives the whole numbers, and the remainer is the Numerator, and the Diviſor the Denominator of the proper Fraction, and this mixt number found ſhall be the true Product as before.

Example.

It is required to multiply $36\frac{5}{9}$ by $18\frac{2}{5}$, by the 1ſt of the 11, the mixt number $36\frac{5}{9}$ is $\frac{329}{9}$ and the mixt number $18\frac{2}{5}$ is $\frac{92}{5}$, now multiply the two Numerators 329 and 92 together, the Product is 30268, which is your new Numerator, and the Product of the two Denominators 9 and 5 is 45 the new Denominator, ſo have you the improper Fraction $\frac{30268}{45}$ being the

Product

Product required; but if you divide the Numerator 30268 by the Denominator 45, the Quotient gives the whole number 672, and the remainer 28 is Numerator to the Divisor 45, so the mixt number 672 $\frac{28}{45}$ is the Product of 36 $\frac{4}{9}$ multiplied by 18 $\frac{2}{5}$ as was required.

If a Compound Fraction be given to be multiplied by a Simple or Single Fraction, reduce that Compound Fraction given into a Simple one by the 6. of the 11th; and proceed according to the instructions of the first Example, in multiplying one by another.

Example.

Let it be required to multiply $\frac{3}{7}$ by $\frac{3}{8}$ of $\frac{2}{9}$ of $\frac{3}{12}$, and this Compound Fraction $\frac{3}{8}$ of $\frac{2}{9}$ of $\frac{3}{12}$ is by the 6th of the 11th reduced to the Simple or Single Fraction $\frac{18}{864}$, which by abbreviation is $\frac{1}{48}$, which multiplied by $\frac{3}{7}$, the Product is $\frac{3}{336}$ as was required.

If the Fractions given to be multiplied are both Compound Fractions, reduce them into Simple ones both, by the 6th of the 11th, and proceed as before, and you have the Product for answer.

Exam-

Example.

It is required to multiply $\frac{7}{9}$ of $\frac{3}{5}$ of $\frac{5}{6}$ by $\frac{6}{7}$ of $\frac{3}{4}$ of $\frac{2}{3}$ by the 6th of the 11th, the Compound Fraction $\frac{7}{9}$ of $\frac{3}{5}$ of $\frac{5}{6}$ is reduced unto $\frac{105}{270}$ and $\frac{6}{7}$ of $\frac{3}{4}$ of $\frac{2}{3}$ unto $\frac{36}{84}$, multiply these two ſimple Fractions Numerator by Numerator, and Denominator by Denominator, and you will have the new Fraction $\frac{3780}{22680}$, which by abbreviation is $\frac{125}{756}$, both which laſt Fractions are either of them equal to the Product of the two given Compound Fractions, multiplied one by another as was required.

If it be required to multiply a Fraction by a whole number, make that whole number a Numerator, and ſet 1 under him for a Denominator, ſo the Fraction will be improper, but multiply their Numerators and Denominators together as before.

Example.

It is required to multiply 16 by ther e-fore I make a Fraction of the whole number thus $\frac{16}{1}$, which multiplied by $\frac{3}{7}$, produceth $\frac{48}{7}$, or 6 $\frac{6}{7}$ as was required.

CHAP.

CHAP. XV.

Division of Fractions.

IF the Dividend and Divisor the two Fractions given are both Simple or Single Fractions, set the Divisor next the left hand, and the Dividend even with it towards the right hand, then multiply them cross-wise thus: Multiply the Numerator of the Dividend, by the Denominator of the Divisor, and the Product is the new Numerator, then multiply the Denominator of the Dividend by the Numerator of the Divisor, and the Product is a new Denominator, which new Fraction is the Quotient you do desire.

Example.

It is required to divide $\frac{4}{5}$ by $\frac{3}{4}$, to effect it I proceed thus, $\frac{4}{5}$ being the Dividend, and $\frac{3}{4}$ the Divisor, I place them as you see, the Divisor to the left hand, and the Dividend to

$\frac{3}{4} \quad \frac{4}{5} \quad \frac{16}{15}$

to the right, so I multiply the Numerator of the Dividend 4 by the Denominator of the Divisor 4, the Product is 16, for a new Numerator, then I multiply the Denominator of the Dividend 5 by the Numerator of the Divisor 3, and the Product 15 is the new Denominator, so I find $\frac{16}{15}$ or 1 $\frac{1}{15}$ is the Quotient sought.

Secondly, if you divide a Simple Fraction by a Compound, or a Compound by a Simple, or Compound by Compound, reduce such Compound Fractions to simple Fractions, then proceed according to the last Example.

Example.

It is required to divide $\frac{7}{9}$ of $\frac{12}{16}$ by $\frac{2}{3}$ of $\frac{5}{8}$, you must reduce $\frac{7}{9}$ of $\frac{12}{16}$, which makes the Simple or Single Fraction $\frac{84}{144}$, and of $\frac{2}{3}$ of $\frac{5}{8}$ $\frac{10}{24}$, so $\frac{84}{144}$ is the Dividend, and $\frac{10}{24}$ is the Divisor, which multiplied cross-wise, as in the last Example, doth produce the Fraction $\frac{2016}{1440}$ for the Quotient, which in a proper Fraction is 1 $\frac{576}{1440}$.

$$\frac{10}{24} \quad \frac{84}{144} \quad \frac{2016}{1440}$$

If

If the Dividend or Divisor, or both be mixt numbers, reduce them to improper Fractions, and perform the Division as in the two last Examples.

Example.

It is required to divide $22\frac{1}{9}$ by $7\frac{2}{3}$ the improper Fraction of $22\frac{1}{9}$ is $\frac{201}{9}$ and of $7\frac{2}{3}$ is $\frac{23}{3}$, so the improper Fraction $\frac{23}{3}$ is the Divisor, and $\frac{201}{9}$ is the Dividend, which if you do multiply cross-wise, you will have the improper Fraction $\frac{603}{207}$, now if you divide the Numerator of this Fraction 603 by the Denominator 207, the Quotient gives 2, and there will remain 189, which is the Numerator, and the Divisor 207 the Denominator, so the mixt number $2\frac{189}{207}$ is the Quotient required.

$$\frac{23}{3} \quad \frac{201}{9} \quad \frac{603}{207}$$

And in like manner must you work if you divide a Fraction by a whole number, or a whole number by a Fracion, as you see in this last Example.

CHAP.

CHAP. XVI.

The Rule of Three Direct in Fractions.

IN the Direct Rule of Three in Fractions there are four things to be observed and practised.

1. That the Fractions of the first and third places be of one Denomination, as Mony, Weight, or Measure.

2. That if any of the given Fractions be Compound, they must be reduced to simple of the same value.

3. If any of the Fractions given should be mixt numbers, reduce it into an impro-Fraction.

4. If any of the three terms given should be a whole number, make it an improper Fraction by putting a Unite for his Denominator.

The Solution of the Rule of Three Direct in Fractions is performed the same way as in whole numbers, that is to say, multiply the second and third Fractions together by the 14th Chapter, and the Product thereof

thereof by the first Fraction, according to the fifteenth Chapter, and the Quotient is the fourth Fraction required.

Another Way.

Multiply the Numerator of the first Fraction by the Denominators of the second and third Fractions, the Product thereof is a new Denominator; then multiply the Denominator of the first Fraction by the Numerators of the second and third Fractions, and the Product is the new Numerator, and this Fraction is the fourth proportional Fraction required, and answer to the Question, which if it should fall out to be an improper Fraction, must be reduced into a whole or mixt number by the third of the eleventh.

Quest. 1. If $\frac{3}{8}$ of a Pound weight cost $\frac{5}{12}$ *l.* what will $\frac{9}{21}$ of a Pound weight cost?

$$\frac{3}{8} \quad \frac{5}{12} \quad \frac{9}{12} \quad \frac{360}{432} \text{ equal to } \frac{5}{6}$$

Having disposed of the given Fractions according to the four first Rules of this

Chapter and the seventh, I proceed to the Solution thus. Multiply the Numerator of the first Fraction which is 3 by 12, and 12 the Denominators of the second and third Fractions, the Product will be 432 for a new Denominator. Then multiply 8 the Denominator of the first Fraction by 5 and 9 the Numerators of the second and third Fractions; the Product thereof is 360, which is a new Numerator. So I have found the fourth proportional Fraction $\frac{360}{432}$ for answer to the Question propounded, and by abbreviation is found equal to $\frac{5}{6}$ or 16 *s.* 8 *d.*

CHAP. XVII.

The Rule of Three Backward in Fractions.

FOr disposing of the given Fractions follow the four Rules in the last Chapter, and the way of resolving is not different from the Instructions of the eighth Chapter, for it was there shewed how to find out a fourth proportional to three given numbers.

When

When you have a Queſtion to be reſolved by this Rule, then the third Term is the Diviſor, then having exactly reduced the Terms given according to the Rules of the laſt Chapter, then multiply the Numerator of the third Fraction by the Denominators of the ſecond and firſt Fractions, and the Product gives a new Denominator, Then multiply the Denominator of the third Fraction by the Numerators of the ſecond and firſt Fraction, and the Product gives a new Numerator, and this new Fraction is the fourth proportional Fraction and anſwer to the Queſtion propounded.

Queſt. If $\frac{7}{8}$ of a Yard of Cloth, that is 1 Yard $\frac{3}{4}$ will make a Garment, how much of another piece of Cloth that is 1 Yard $\frac{2}{5}$ wide will make the ſame Garment.

$$\frac{7}{8} \qquad 1\frac{3}{4} \qquad 1\frac{2}{5}$$

$$\frac{7}{8} \qquad \frac{7}{4} \qquad \frac{7}{5} \qquad \frac{245}{224}$$

Facit 1 $\frac{21}{224}$.

Here you ſee in this Queſtion the ſecond and third Fractions are mixt Fractions, there you ſee they are reduced to improper Fractions, ſo the three given Fractions are $\frac{7}{8}$, $\frac{7}{4}$ and $\frac{7}{5}$. Now according to the former Inſtructions of this Chapter, I multiply the Numerator of the third Fraction being 3, by the Denominators of the ſecond and firſt Fractions, which is 4 and 8, the Product thereof is 224, which is a new Denominator. Then I multiply the Denominator of the third Fraction 5 by the Numerators of the ſecond and firſt Fractions, which is 7 and 7, the Product thereof will be 245, which is a new Numerator. So I have found out the improper Fraction $\frac{245}{224}$, which reduced is 1 $\frac{21}{224}$ equal to 1 $\frac{3}{32}$, which is the anſwer to the propounded Queſtion.

CHAP.

CHAP. XVIII.

The Rule of Practice.

THE Rule of Practice is ſo called becauſe it is the Practice of the other Rules, and chiefly of the Rule of Three, in a far more compendious and ſhorter way, being by ſome called the brief Rules, becauſe thereby many Queſtions may be operated with more expedition than by the Rule of Three, and becauſe this Rule is ſo expeditious in finding a reſolution to any Queſtion propounded, it is therefore of infinite great Uſe amongſt Merchants, Tradeſmen and others.

It is very convenient for the Learner to get perfectly by Heart the annexed Table containing the Product of 12 multiplied by all the nine Digits, for the

1	times 12 is	12
2		24
3		36
4		48
5		60
6		72
7		84
8		96
9		108

ſpeedy reducing Pence into Shillings, and Shillings into Pence; and for reducing Shillings into Pounds, I refer the ingenious Reader to the ſixth Chapter, in Reduction of Mony.

	s.	f.		
The even Parts of a Shilling.	6		is the	$\frac{1}{2}$
	4			$\frac{1}{3}$
	3			$\frac{1}{4}$
	2			$\frac{1}{6}$
	1	$\frac{1}{2}$		$\frac{1}{8}$
	1			$\frac{1}{12}$
		$\frac{3}{4}$		$\frac{1}{16}$
		$\frac{1}{2}$		$\frac{1}{24}$
		$\frac{1}{4}$		$\frac{1}{48}$

	s.	d.		
The even Parts of a Pound.	10		is the	$\frac{1}{2}$
	6	8		$\frac{1}{3}$
	5	0		$\frac{1}{4}$
	4	0		$\frac{1}{6}$
	3	4		$\frac{1}{8}$
	2	6		$\frac{1}{8}$
	2	0		$\frac{1}{10}$
	1	8		$\frac{1}{12}$
	1	0		$\frac{1}{20}$

I would likewiſe adviſe the Learner to get the two foregoing Tables by Heart, the firſt containing the even parts of a Shilling, the ſecond the even parts of a Pound.

When a Queſtion is propounded to be reſolved, you muſt conſider whether the price of the Integer be parts of a Shilling, or parts of a Pound.

And whether the ſaid price be either the even part of a Shilling, or the even part of a Pound; if it be neither the even part of a Shilling, nor the even part of a Pound, you may divide the ſaid price into ſo many parts that each part may be the even part either of a Shilling or Pound, as 5 *d.* $\frac{1}{4}$ may be divided into three even parts of a Shilling, *viz.* 3 *d.* which is $\frac{1}{4}$ of a Shilling, 2 *d.* which is $\frac{1}{6}$, and $\frac{1}{4}$ which is $\frac{1}{16}$.

Propoſition 1.

If the price of a Unite of the Sum propounded be a Farthing, I find by the Table a Farthing to be the $\frac{1}{48}$ of a Shilling, but becauſe the 48. part of any Sum is not ſo ſoon taken as the $\frac{1}{2}$, the $\frac{1}{3}$, the $\frac{1}{4}$, the $\frac{1}{6}$, the $\frac{1}{8}$, and the like, therefore becauſe 8 Farthings make 2 *d.* I divide the given

number by 8, that is to ſay, I take the eighth part, and if any thing remain they are all Farthings. Then by the Table I find that 2 *d.* is $\frac{1}{6}$ of a Shilling, therefore take the ſixth part of them for Shillings, and what remains is ſo many two Pences ; now theſe Shillings reduce into Pounds, by cutting off the firſt figure to the right hand, with a ſmall ſtroak with your pen ; then draw a line underneath, and take half of the remaining figures, which I ſet under the line for ſo many Pounds ; but if the laſt figure you are to halve be an odd figure, take the half and add 10 to the figure cut off, for that figure and the 10 added together makes ſo many Shillings.

Example. Let it be required to know how much 9783 *l.* at a Farthing *per* Pound cometh to. Firſt, as you ſee in the following Example, take the eighth part of 9783, and it is 1222 two Pences, and 7 Farthings remaining, which is 1 : $\frac{3}{4}$ I ſet a little diſtance to the right hand, next by the Table of the even parts of a Shilling, I find 2 *d.* to be the $\frac{1}{6}$ part, therefore I draw a line under 1222, and take the $\frac{1}{6}$ part thereof, which is 203 Shilling, and 4 remaining which is ſo many two pences ; therefore I ſet

ſet down 8 under the laſt Remainer, I draw a line under theſe Shillings 203, and reduce them into Pounds, according to the Inſtructions hereof, and of the ſixth Chapter of Reduction of Mony, by cutting off the firſt figure towards your right hand, which is 3, and drawing a line I take the half of the Remainer 20, which is 10 Pounds, and the figure 3 cut off ſignifieth ſo many Shillings. Now I add all theſe odd Remains together, *viz.* 1 : $\frac{3}{4}$, 8 *d.* unto 10 *l.* 3 *s.* So the whole Sum is 10 : 3 : 9 : $\frac{3}{4}$, the Reſolution of the propounded Queſtion, as by the following Operation.

$\frac{1}{8}$	9783 *l.* at $\frac{1}{4}$ *per l.*	
$\frac{1}{6}$	1222	1 : $\frac{3}{4}$.
$\frac{1}{2}$	203	8
	10 : 3 : 9 : $\frac{3}{4}$ *Facit.*	

For the more clear demonſtration of what hath been ſo far ſaid of this Rule, I ſhall ſet down more Examples.

$\frac{1}{8}$	65937 *l.* at $\frac{1}{4}$ per *Pound.*		
$\frac{1}{6}$	8242		$\frac{1}{4}$
$\frac{1}{20}$	137|3		8
	68 :	13 :	8 : $\frac{1}{4}$ *Facit.*

$\frac{1}{8}$	743965 *l.* at $\frac{1}{4}$ per *Pound.*		
$\frac{1}{6}$	92995		1 : $\frac{1}{4}$
$\frac{1}{20}$	1549|9		2
	774 :	19 :	3 : $\frac{1}{4}$ *Facit.*

In the first Example it is propounded 65937 *l.* at a Farthing *per* Pound, the $\frac{1}{8}$ thereof is 8242 two Pences, and $\frac{1}{4}$ Farthing remaining, the $\frac{1}{6}$ of 8242 two Pences is 1373 Shillings, and 4 two pences remaining is 8 *d.* Next the $\frac{1}{20}$ of 1373 Shillings is 68 Pounds, and 13 Shillings remaining; so taking all the Remains to this last Sum, it makes 68 : 13 : 8 $\frac{1}{4}$, and so much doth 65937 *l.* come to at a Farthing *per* Pound; and

and in the ſame manner is the other Example explained. The reaſon why I take the $\frac{1}{8}$ and $\frac{1}{6}$ in theſe Examples of a Farthing, and not $\frac{1}{48}$, is becauſe the $\frac{1}{6}$ of $\frac{1}{8}$ is equal to $\frac{1}{48}$.

Propoſition 2.

If the value of a Unite in the Sum of the propounded Queſtion be 2 Farthings, then firſt take the $\frac{1}{4}$ and afterwards the $\frac{1}{6}$; for although 2 Farthings be the $\frac{1}{24}$ of a Shilling, yet $\frac{1}{4}$ of $\frac{1}{6}$ is eqaal thereunto, and done with more eaſe and leſs charge to the memory than to take the $\frac{1}{24}$ of any Sum, having thus taken the $\frac{1}{4}$ to reduce them into two pences, if any thing remain they are ſo many half pence, then $\frac{1}{6}$ reduceth them into Shillings as before.

Examples.

$\frac{1}{4}$	57632 *l.* *at 2 quarters.*
$\frac{1}{6}$	14408
$\frac{1}{20}$	240|1 : 4
	120 : 1 : 4 *Facit.*

$\frac{1}{4}$	76597 *l.* *at* 2 *quarters.*
$\frac{1}{6}$	19149 2 *quarters.*
$\frac{1}{20}$	319|1 : 6
	159 : 11 : 6 : 2 *quarters* Facit.

In the first of these Examples it is required to know how much 57632 *l.* at 2 quarters *per* Pound cometh unto, knowing 4 half pence do make 2 *d.* I therefore do take $\frac{1}{4}$ of 57632 which is 14408 two pences ; then I take $\frac{1}{6}$ of 14408 which is 2401 Shillings, and there remains 2 two pences which is 4 *d.* Then the $\frac{1}{20}$ of 2401 Shillings is 120 Pounds, and there doth remain 1 Shillings. So the Sum makes 120 *l.* 1 *s.* 4 *d.*

In the second Example the $\frac{1}{4}$ of 76597 is 19149 two pences, and there remains 1 half penny ; the $\frac{1}{6}$ of 19149 is 3191 Shillings, and there doth remain 3 two pences, which is 6 Pence, and the $\frac{1}{20}$ of 3191 is 159 Pound, and 11 Shillings remaining. So the whole Sum doth amount to 159 *l.* 11 *s.* 6 *d.* 2 quarters.

Pro-

Proposition 3.

If the price of a Unite in Sum propounded be 3 Farthings, then take the $\frac{1}{4}$ of Sum propounded which will be three pences, and if any thing remains it will be so many three farthings. Then the $\frac{1}{4}$ of the three pences is Shillings, and what doth remain is so many three pences, and the $\frac{1}{20}$ of those Shillings is Pounds, as before.

Example.

$\frac{1}{4}$	3674 *l.* at 3 *quarters.*			
$\frac{1}{4}$	918		1	2 *quarters.*
$\frac{1}{20}$	22|9		6	
	11	9	7	2 *Facit.*

$\frac{1}{4}$	769327 *l.* at 3 *quarters.*			
$\frac{1}{4}$	192331		2	1 *quarter.*
$\frac{1}{20}$	4808|2		9	
	2404	2	11	1 *quarter* Facit.

In

In the last of these Examples you find it required for to know how much *769327 l.* at 3 Farthings *per* Pound cometh to? the $\frac{1}{4}$ of *769327* is 192331 three pences, and there remains three times three Farthings, which is 2 *d.* 1 *qu.* then the $\frac{1}{4}$ of 192331 is 48082 Shillings, and there remains 3 three pences, which is 9 *d.* Then the $\frac{1}{20}$ of 48082 is 2404 Pounds and 2 Shillings remaining. So the whole amounts unto 2404 : 2 : 11 : 1 *qu.*

Proposition 4.

If the price of an Unite of the Sum propounded to be resolved be an even part of a Shilling, and above the value of 3 Farthings, divide the number given whose value is sought, by the Denominator of the Fraction representing the even part, the Quotient thereof will be Shillings, then take $_{0}$ for Pounds as before.

Example. Let it be required to know how much 28376 *l.* at $\frac{1}{2}$ cometh to? by the Table I find 1 : $\frac{1}{2}$ is $\frac{1}{8}$ of a Shilling, therefore I divide the number 28376 by 8, or which is all one, I take the $\frac{1}{8}$ which is 35 7 Shillings, the $\frac{1}{20}$ of 3547 Shillings is

is 177 Pound and 7 Shillings remaining, as by the following Operation.

$\frac{1}{8}$	28376 *l.* at 1 : 2 *qu.* per *Pound.*
$\frac{1}{20}$	3547
	177 : 7 *s.* Facit.

Of every even part of a Shilling above the value of 3 Farthings, I have demonſtrated by theſe following Examples, which need little or no explanation, being ſo plain that at firſt ſight they may be underſtood.

Examples.

I.

$\frac{1}{2}$	7832 *l.* *at* 6 *d.* per *Pound.*
$\frac{1}{20}$	391|6
	195 : 16 *s.* Facit.

II.

II.

$\frac{1}{3}$	34976 *l.* *at* 4 *d.* per *Pound.*	
$\frac{1}{20}$	1165|8	8 *d.*
	582 : 18 : 8 Facit.	

III.

$\frac{1}{4}$	5637 *l.* *at* 3 *d.* per *Pound.*	
$\frac{1}{20}$	410'9 : 3	
	70 : 9 : 3 Facit.	

IV.

$\frac{1}{6}$	76498 *l.* *at* 2 *d.* per *Pound.*	
$\frac{1}{20}$	1274|9	8
	637 : 9 : 8	

V.

$\frac{1}{8}$ | 49283 *l.* *at* 1 : $\frac{1}{2}$ per *Pound.*

$\frac{1}{20}$ | 616|0 4 : 2 *qu.*

308 : 0 : 4 : 2

VI.

$\frac{1}{2}$ | 93674 *l.* *at* 1 *d.* per *Pound.*

$\frac{1}{20}$ | 780|6 2

390 : 6 : 2

Propofition 5.

If the price of a Unite of the propounded Sum be Pence, and not the even part of a Shilling, then you muft divide the price given into even parts, as 7 *d.* is no even part of a Shilling, yet may be divided into even parts, as 4 *d.* and 3 *d.* make 7 *d.* and are both even parts of a Shilling, in which cafe work thus. Firft take $\frac{1}{3}$ and then the $\frac{1}{4}$ of the given number, and add the $\frac{1}{3}$ and

and $\frac{1}{4}$ of the number given together, and you have the true number of Shillings, the $\frac{1}{20}$ whereof is Pounds as before. Likewise 9 *d.* is $\frac{1}{2}$ and $\frac{1}{4}$ or three times $\frac{1}{4}$, 11 *d.* is $\frac{1}{2}$ and $\frac{1}{4}$ and $\frac{1}{6}$ or else it is $\frac{1}{3}$ and $\frac{1}{3}$ and $\frac{1}{4}$ of a Shilling, as by the following Operations doth more plainly appear, where you have an Example of every uneven part of a Shilling, the price being any number of pence only.

I.

4763 Yards at 5 d.

$\frac{1}{4}$	1190		9
$\frac{1}{6}$	793		10
	198|4	0	7
	99	4	7

II.

74862 Yards at 7 d.

$\frac{1}{3}$	24954		
$\frac{1}{4}$	18715		6
	4366|9		6
	2183	9	6

III.

III.

3764 *Ells at* 8 *d.*

$\frac{1}{3}$	1254		8
$\frac{1}{3}$	1254		8
$\frac{1}{20}$	250|9		4
	125	9	4 Facit.

IV.

7492 *Ells at* 9 *d.*

$\frac{1}{4}$	1873		
$\frac{1}{4}$	1873		
$\frac{1}{4}$	1873		
$\frac{1}{20}$	561|9		
	280	19	00 *Facit.*

V.

62543 *Ells at* 10 *d.*

$\frac{1}{2}$	31271		6
$\frac{1}{3}$	20847		8
$\frac{1}{20}$	5211|9		2
	2605	19	2

VI.

VI.

	46273	*Ells at* 11 *d.*	
$\frac{1}{2}$	23136		6
$\frac{1}{4}$	11568		3
$\frac{1}{6}$	7712		2
$\frac{1}{20}$	4241|6		11
	2120	16	11

Proposition 6.

When the price of a Unite of the given number be Pence and Farthings, and if it be an even part of a Shilling, work as in the fourth Proposition; but if it be uneven parts of a Shilling, as 1 : $\frac{1}{4}$, 1 : $\frac{3}{4}$, 2 : $\frac{1}{2}$, 2 : $\frac{3}{4}$, or the like.

First find out some part of the price that is an equal part of a Shilling; then consider what part the Remainer of the price is of that even part, and divide that even part thereby, then take their Sum which is the true number of Shillings, the $\frac{1}{20}$ whereof is Pounds, as before.

Exam-

Example. It is required to know how much 28762 *l.* is worth at 1 : $\frac{1}{4}$. First I take the $\frac{1}{12}$ which is 2396 Shillings, and

	28762 *l.* *at* 1 : $\frac{1}{4}$.		
$\frac{1}{2}$	2396	10	
$\frac{1}{4}$	599	2 : $\frac{1}{2}$	
$\frac{1}{20}$	299|6		
	149 :	16 : $\frac{1}{2}$	

there remains 10 *d.* Now 2396 Shillings 10 *d.* being the valne of the said number at 1 *d. per* Pound, and 1 Farthing being $\frac{1}{4}$ of a Penny, therefore the $\frac{1}{4}$ of the value at 1 *d. per* Pound 2396 Shillings and 10, which is 599 Shillings 2 : $\frac{1}{2}$ is the value of the said number at 1 Farthing *per* Pouud, which added together gives 2996 Shillings one half penny, the $\frac{1}{20}$ whereof 149 : 16 : 0 : 2 *qu.* is the whole Sum required.

I.

$\frac{1}{8}$ | 6742 *l.* *at* 1 *d.* 3 *qu.*

$\frac{1}{6}$ | 842 9
140 5 : $\frac{1}{2}$

98|3 2 $\frac{1}{2}$

49 3 2 $\frac{1}{2}$ Facit.

II.

$\frac{1}{6}$ | 56284 *l.* *at* 2 *d.* 1 *farthing.*

$\frac{1}{8}$ | 9380 8
1172 7

1055|3 3

527 13 3 Facit.

III.

$\frac{1}{6}$ | 59832 *l.* *at* 2 *d.* 2 *qu.*

$\frac{1}{4}$ | 9972
2493

1246|5

623 5 *s.* Facit.

IV.

IV.

$\frac{1}{6}$	37682 *l.*	at 2 *d.* 3 *qu.*		
$\frac{1}{4}$	6280		4	
$\frac{1}{2}$	1570		1	
	785			2 *qu.*
	863|5		5	2 *qu.*
	431	15	5	2 *qu.*

V.

$\frac{1}{4}$	27645 *l.*	at 3 *d.* 2 *farthings.*		
$\frac{1}{6}$	6911		3	
	1151		10 : 2	
$\frac{1}{20}$	806|3		1 : 2	
	403	3	1 : 2	Facit.

VI.

VI.

$\frac{1}{4}$	76892 *l. at* 4 *d.* 2 *farthings.*		
$\frac{1}{2}$	19223		
	9611		6
$\frac{1}{20}$	2883|4		6
	1441	14	6 Facit.

VII.

	36924 *l. at* 5 *d.* 2 *farthings.*		
$\frac{1}{1}$	12308		
$\frac{1}{4}$	3077		
$\frac{1}{2}$	1538		6
$\frac{1}{20}$	1692|3		6
	846	3	6 Facit.

VIII.

VIII.

36279 *l.* at 8 *d.* 2 *farthings.*

$\frac{1}{3}$	12093		
$\frac{1}{3}$	12093		
$\frac{1}{8}$	1511		7 : $\frac{1}{2}$
$\frac{1}{20}$	2569|7		7 2
	1284	17	7 : $\frac{1}{2}$

IX.

46253 *l.* at 10 *d.* 3 *farthings.*

$\frac{1}{2}$	23126		6
$\frac{1}{2}$	11563		3
$\frac{1}{2}$	5781		7 $\frac{1}{2}$
$\frac{1}{6}$	0963		7 $\frac{1}{4}$
$\frac{1}{20}$	4143|4		11 $\frac{3}{4}$
	2071	14	11 $\frac{3}{4}$

X.

	5678 *l.* at 11 *d.* 3 *farthings.*		
½	2839		
⅓	1892		8
¼	473		2
½	236		7
½	118		3 ½
$\frac{1}{20}$	555|9		8 ½
	277	19	8 ½

In the foregoing Examples you may perceive how the ſeveral Examples are wrought by dividing the given price into ſo many even parts as will make the compleat price, although it may conſiſt of 3, 4 or 5 Diviſions, as in the 10. Example the price is 11 *d.* 3 *qu.* which is made up with the ½, and ⅓, and ¼ of the ⅓, and the ½ of the ¼, and the ½ of that ½, as 6, 4, 1, ½ and ¼, which all put together makes 11 ¾.

Pro-

Proposition 7.

If the price of a Unit of the given number be 2 Shillings, cut off the figure toward the right hand of the given number, and double it, the Product will be Shillings, and the remaining figures towards the left hand are Pounds.

Example.

Let it be required to know how much 1283 Yards are worth at 2 Shillings *per* Yard, the figure toward the right hand which is 3 being cut off and doubled makes 6 Shillings, and the remaining figures 128 are Pounds. So the true worth of 1283 Yards at 2 Shillings *per* Yard cometh to 128 Pounds, 6 Shillings, as by the annexed Example may appear, being the answer and solution of the question, as was required.

128|3

---

128 *l.* 6 *s.*

By this Proposition we gather, that when the price of any number of Yards, Pounds, *&c.* is an even number of Shillings, with the half of the even number,

multiply the given number, but double the first figure of the Product, and set it apart for Shillings, and the rest of the Product shall be Pounds.

Example.

Let it be required to know how much 5783 Ells of Linnen cometh unto at 14 *s.* *per* Ell, for the solution whereof, I take half of the price given, which is 7, and therewith I do multiply the given number 5783; saying, 7 times 3 is 21; now according to the Rule I double the first figure 1, which makes 2 Shillings, setting it apart, and I carry 2 to the next figure, saying, 7 times 8 is 56, and 2 as I carried is 58, set down 8 and carry 5, proceeding according to the Instructions of the 4 Chapter, and you will find the remaining part of the Product, to be 4048. So I find that 5783 Yards, Ells or Pounds at 14 is worth 4048 *l.* 2 *s.* as by the annexed Example doth appear.

5783	*Ells at* 14 *s.*
7	
4048 *l.* 2 *s.*	

Pro-

Propoſition 8.

If the price of a Unit of the given number be any odd number of Shillings, work the even number of Shillings by the laſt Example of the 7. Propoſition, and for the odd Shillings take the $\frac{1}{20}$ of the given number, and add theſe two together, and you will find your deſire, as by theſe following Examples doth appear; where in the firſt towards your left hand it is required to know how much 7393 Yards cometh unto at 7 *s. per* Yard, for the even number of

7393 Yards at 7 s.	*3767 Yards at 9 s.*
2217 *l.* 18 *s.*	1506 *l.* 16 *s.*
369 : 13 *s.*	188 7 *s.*
2587 *l.* 11 *s.*	1695 *l.* 03 *s.*

6 *s. per* Yard by the ſecond Example of the 7. Propoſition, 7393 Yards cometh to 2217 *l.* 18 *s.* then the $\frac{1}{20}$ of 7393 is 369 *l.* 13 *s.* which added together make 2587 *l.* 11 *s.* the true value of 7393 Yards as was required, and in like manner is the other

Example operated for 3767 Yards at 9 *s.* *per* Yard.

Proposition 9.

If the price of a Unit of the given number be 5 *s.* then the Operation, although it be an odd number of Shillings, may by taking the $\frac{1}{4}$ be done sooner, as by the following Examples doth more plainly appear.

$\frac{1}{4}$	2836 *Yards at* 5 *s.* per *Yard.*
	709 *l.* Facit.
$\frac{1}{4}$	6937 *Yards at* 5 *s.*
	1734 *l.* 5 *s.* Facit.

Proposition 10.

If the price of a Unite of the given number be Shill. and Pence, or Shill. Pence and Farthings, if the Shill. and Pence be an even part of a Pound, divide the number given by the Denominator of that Fraction representing the said even part, as by the following

ing Example wherein it is required to know how much 576 Yards amount to at 3 *s.* 4 *d. per* Yard. First by the Table of the even parts of a Pound I find 3 *s.* 4 *d.* to be the $\frac{1}{6}$ of a Pound, therefore I divide 576 by 6, which is the Denominator of the Fraction, or which is all one, I take the sixth part thereof which is 96, So I find that 576 Yards at 3 *s.* 4 *d.* cometh unto 96 *l.* as was required.

$\frac{1}{6}$	576
	96 *l.* Facit.

For further explanation sake I have set down these several following Examples.

$\frac{1}{3}$	4627 *Yards at* 6 *s.* 8 *d.* per *Yard.*
	1542 *l.* 6 *s.* 8 Facit.
$\frac{1}{6}$	3597 *Yards at* 3 *s.* 4 *d.* per *Yard.*
	599 *l.* 10 *s.*
$\frac{1}{8}$	97839 *Yards at* 2 *s.* 6 *d.*
	12229 : 17 : 6 Facit.

$\frac{1}{2}$	46398 *at* 1 *s*. 8 *d*.
	3866 *l*. 10 *s*.

Propoſition II.

When the price of a Unit of the number given is Shillings and Pence, but not the even part of a Pound, you muſt reduce them into even parts, as 8 *s*. 4 *d*. may be reduced into the even parts 6 *s*. 8 *d*. and 1 *s*. 8 *d*. which make 8 *s*. 4 *d*.

Likewiſe 7 *s*. 6 *d*. may be reduced into theſe even parts 5 *s*. and 2 *s*. 6 *d*. which make up 7 *s*. 6 *d*. add together the ſeveral Products of ſuch reduced even parts, and their Sum is the anſwer to the queſtion propounded, as by theſe following Examples may appear.

	2974 *Yards at* 8 *s*. 4 *d*. per *Yard*.		
$\frac{1}{3}$	991	6	8
$\frac{1}{12}$	247	16	8
	1239	03	4

3568 *at* 9 *s.* 6 *d.* per *Yard.*

6	1070	8 *s.*	
$\frac{1}{8}$	446		
$\frac{1}{20}$	178	8	
	1694	16	

7482 *Yards at* 7 *s.* 4 *d.*

$\frac{1}{5}$	1496	8	
$\frac{1}{6}$	1247		
	2743 *l.*	8 *s.*	Facit.

5679 *Yards at* 7 *s.* 6 *d.*

$\frac{1}{4}$	1419	15	
$\frac{1}{8}$	709	17	06
	2129	12	06 Facit.

6837 *Yards at* 12 *s.* 6 *d.*

$\frac{1}{6}$	3418	10 *s.*	
$\frac{1}{8}$	854	12	6
	4273	02	6

	4353	*Yards at* 9 *s.* 2 *d.*	
$\frac{1}{4}$	1088	5	
$\frac{1}{8}$	544	2	6
$\frac{1}{12}$	362	15	
	1995	02	6 Facit.

Proposition 12.

When the price of a Unite of the given number is Pence and Shillings, but cannot be reduced to even parts, then in ſuch caſe multiply the given number by the number of Shillings contained in the price given, and after by the fourth or fifth Propoſition hereof, then add the ſeveral Products found together, their Sum is the total in Shillings, as by this Example following.

Let it be required to know how much 5734 Yards cometh to at 9*s.* 9 *d. per* Yard: according to the Rule I multiply the given number 5734 by 9, the Product gives me 51606 Shillings, therefore 9 *d.* being no even part of a Shilling, I by the fifth Propoſition divide them into even parts 6 and 3, taking the $\frac{1}{2}$ of the given number 2867, and

and the $\frac{1}{4}$ which is 1433, these Products added together make 55906 Shillings and 6 Pence, the $\frac{1}{20}$ thereof is 2795 Pounds, 6 Shillings and 6 Pence.

	5734 *Yards at*	*9 s. 9 d.*	
	9		
	51606		
$\frac{1}{2}$	2867		
$\frac{1}{4}$	1433		*6 d.*
	5590|6		*6 d.*
	2795	6	*6 d.*

Proposition 13.

When the price of a unit of any number given be Shill. Pence and Farthings, then tiply your given number by the number of Shillings contained in the given price, and your Product will be Shillings; then for the Pence and Farthings work by the sixth Proposition of this Chapter, as by the following Examples doth appear. In the first whereof it is required to know how much 1743 Yards come to at 7 *s.* 3 *d.* $\frac{3}{4}$ first I mul-

multiply the given number 1743 by 7, the number of Shillings in the price given, the Product thereof is 12201 Shillings; then by the sixth Proposition I find the Product for 3 *d.* $\frac{1}{4}$, adding them together I find they do make 12745 Shillings 8 *d.* $\frac{1}{4}$.

	1743 *Yards at* 7 *s.* 3 *d.* $\frac{1}{4}$. per *Yard.*			
	7			
7	12201			
$\frac{1}{4}$	435		9 *d.*	
$\frac{1}{4}$	108		11 $\frac{1}{4}$	
$\frac{1}{2}$	1274|5		8 $\frac{1}{2}$	
	637	5	8 $\frac{1}{4}$	Facit.
	3785 *Yards at* 9 *s.* 7 *d.* $\frac{1}{2}$.			
	9			
9	34065			
$\frac{1}{2}$	1892		6	
$\frac{1}{4}$	473		1	
$\frac{1}{20}$	36430		7 $\frac{1}{2}$	
	1821	10	7 $\frac{1}{2}$	

Pro-

Propoſition 14.

When the price of a Unite of any number given is Pounds, multiply the number given by the number of Pounds contained in the price, and the Product is the number of pounds required, as by theſe two following Examples you may diſcern.

342 *C. at* 3 *Pound*	748 *C. at* 7 *Pound.*
8	7
1026	5236

Propoſition 15.

When the price of any given number is Pounds and Shillings, work for the Pounds as by the laſt Propoſition, and for the Shillings as by the 7. and 8. then add the ſeveral Products together, and the Sum is the value ſought as was required, as by theſe following Examples.

98 *C. at* 4*l.* 6 *s.* per *C.*
4

392
29 8

421 *l.* 8 *s.* Facit.

147 C. at 3 *l.* 13 *s.*
3

441
88 4
7 7

536 *l.* 11 *s.* Facit.

346 C. at 7 *l.* 9 *s.*
7

2422
138 8
17 6

2577 *l.* 14 *s.* Facit.

283 C. at 9 *l.* 17 *s.*
9

2547
226 8
14 3

2787 *l.* 11 *s.* Facit.

Pro-

Propoſition 16.

When the given price of a Unite of the number given is Pounds, Shillings, Pence and Farthings. Firſt, find out the whole value of the given number in Shillings, Pence and Farthings, by the Inſtructions of the 13. Propoſition of this Chapter, as if there had been no Pounds in the given price, then for the Pounds work as by the directions of the 15. Propoſition, then add theſe two Products thus found together, and their Product or Sum ſhall be the whole value of the given number at the price propounded.

372 *C.* *at* 3 *l.* 7 *s.* 8 *d.* ½.

2604		
186		
62		
15		6
286|7		6
143	7	6
1116		
1259	7	6 Facit.

539 C. at 8 *l.* 11 *s.* 7 *d.* ½.

539		
539		
5929		
269		6 *d.*
67		4 ½
626|5		10 ½
313	5	10 ½
4312		
4625	5	10 ½ Facit.

478 C. 7 *l.* 12 *s.* 5 *d.* ¾.

956		
478		
5736		
159		4 *d.*
59		9
9		11 ½
596|5		0 ½
298	5	0 ½
3346		
3644	5	0 ½ Facit.

837 C. at 9 *l.* 17 *s.* 9 *d.* $\frac{1}{4}$.

5859			
837			
14229		d.	
209		3	
209		3	
209		3	
17		5	$\frac{1}{4}$
1487'4		2	$\frac{1}{4}$
743	14	2	$\frac{1}{4}$
7533			
8276	14	2	$\frac{1}{4}$

Proposition 17.

If the given number whose value is required be of several Denominations, as Hundreds, Quarters and Pounds; for the Hundreds, follow the directions of the last Proposition, and for 2 quarters take half the given price, for 1 quarter take $\frac{1}{4}$, for 14 pound take $\frac{1}{8}$, for 7 pound take $\frac{1}{16}$ of the

the given, then add all these Products together, and you have the full value required, as by these following Examples doth appear.

36 C. 3 qu. 14 l. at 5 l. 5 s.

180		
9		
2	12	6
1	06	3
	13	1 ½
193	11	10 ½ Facit.

72 C. 2 qu. 7 l. at 7 l. 3 s. 4 d.

504		
12		
3	11	8
	8	11 ½
520		7 ½ Facit.

438 C.

438 *C.* 1 *qu.* 21 *l.* *at* 3 *l.* 6 *s.* 8 *d.*

1314			
146			
	16	8	
	8	4	
	4	2	
1461	09	2	Facit.

356 *C.* 2 *qu.* 14 *l.* *at* 9 *l.* 7 *s.* 6 *d.*

3204			
89			
44	10	0	
4	13	9	
1	03	5	$\frac{1}{4}$
3342	07	1 $\frac{1}{4}$	Facit.

CHAP.

CHAP. XIX.

The Rule of Fellowship without Time.

THe Rule of Fellowship without Time, is when several Merchants do put in each man his several and particular Sum of Mony, without any respect at all to any Time, but to have such a proportion of the gain as he hath in the Stock.

Example.

A,*B*,*C* and *D* make a Stock of 20 Pound, in which *A* hath 5 Pound, which is $\frac{1}{4}$,

	l.
A——— ———————	5
B——— ———————	10
C——— ———————	3
D——— ———————	2
	20

B hath 10 Pound which is $\frac{1}{2}$, *C* hath 3 *l.* which is $\frac{3}{20}$, and *D* hath 2 Pound which is

$\frac{2}{20}$. By this 20 Pound they do gain 7 *l.* which makes the Stock 27 Pound; now that perſon that hath $\frac{1}{4}$ in the firſt Stock, muſt alſo have $\frac{1}{4}$ of the profit, which is 1 *l.* 15 *s.* and he that hath $\frac{1}{2}$ of the firſt Stock muſt have $\frac{1}{2}$ of the Profit which is 3 *l.* 10 *s.* and he that hath $\frac{3}{20}$ of the firſt Stock muſt likewiſe have $\frac{3}{20}$ of the profit, which is 1 *l.* 1 *s.* and he that hath $\frac{2}{20}$ of the firſt Stock muſt have $\frac{2}{20}$ of the profit, which is 14 *s.* as you ſee.

		Stock.		*Profit.*	
A	$\frac{1}{4}$	5	———	1	15
B	$\frac{1}{2}$	10	———	3	10
C	$\frac{3}{20}$	3	———	1	01
D	$\frac{2}{20}$	2	———		14
		20		7	

Now to find out each mans ſeveral ſhare in the profit or loſs, you muſt collect the ſeveral Sums paid into Stock together, and by addition find their Sum, then by the Rule ſay, As the Sum of the ſeveral partners ſhares is to the profit or loſs, ſo is each mans particular ſhare in Stock to his particular ſhare in the profit or loſs, and as

as many ſhares as the principal Stock doth contain, ſo many Operations will there be of the Rule of Three, the fourth proportional of each Operation being the reſpective ſhare in the profit or loſs, belonging to that ſhare of the Stock, which is the third number in the ſame Operation.

Example 1.

Four Partners, *viz.* *A*, *B*, *C* and *D* make up a Stock, in which Stock they have each different and unequal ſhares. *A* puts in 160 *l.* *B* put in 80 Pound, *C* puts in 144 Pound, and *D* put in 96 *l.* now there was gained by the whole Stock 126 *l* the queſtion is how much of the 126 *l.* each Partner to is have according to his ſhare in the Stock.

	l.	*s.*	*d.*
A ————	160		
B ————	80		
C ————	144		
D ————	96		
	480		

Accord-

According to the former directions, I add the ſeveral ſhares together, and they do make 480 Pounds, now becauſe there are four ſeveral ſhares, there will be four Operations by the Rule of Three, which are as follow.

If 480 *l.* give 126 *l.* what will 160 *l*? *Anſ.* 42 *l.*

If 480 *l.* give 126 *l.* what will 80 *l*? *Anſ.* 21 *l.*

If 480 *l.* give 126 *l.* what will 144 *l*? *Anſ.* 37 *l.* 16 *s.*

If 480 *l.* give 126 *l.* what will 96 *l*? *Anſ.* 25 *l.* 04 *s.*

And theſe fourth proportionals found are due to the ſeveral partners over and above their reſpective ſhares, as to *A* 42 *l.* to *B* 21 *l.* to *C* 37 : 16, and to *D* 25 *l.* 4 *s.* as you ſee following, which being added altogether make 126 *l.* as before, equal to the Sum that was gained.

A————————	42	
B————————	21	
C————————	37 :	16
D————————	25 :	04
	126	

The

The adding together of these fourth proportionals found is the proof of the single Rule of Fellowship, for if they make up the same Sum as was gained by the whole Stock, or lost, then your several Operations have been right worked, if there be any difference you may certainly conclude you have committed some errour.

Example 2.

Two Partners join together and are resolved to make up a Stock, *viz.* *A* and *B*. The first Partner *A* doth resolve to have $\frac{4}{7}$ of the profit, and layeth in 1368 Pound. It is required to know how much *B* must pay into Stock to gain the remaining $\frac{3}{7}$ of the profit.

By the Rule of Three, say, If $\frac{4}{7}$ of the gain which the first man *A* taketh, did pay into Stock $\frac{1368}{1}$, how much must $\frac{3}{7}$ of the gain lay into Stock, which is the second man *B* profit, which by multiplying and dividing you will find to be 1026 *l.* and so much must *B* lay into Stock to gain $\frac{3}{7}$ of the profit, if *A* gaineth $\frac{4}{7}$ by putting in 1368 *l.*

Exam-

Example 3.

Six Partners, *viz.* *A*, *B*, *C*, *D*, *E* and *F* build a Ship between them, amounting to the Sum of 2376 Pounds: the ſeveral Partners put in as followeth.

	l.	*s.*
A put in	222	15
B ——	271	05
C ——	519	15
D ——	297	00
E ——	816	15
F ——	148	10
	2376	

Theſe Partners let their Ship out to Freight for a certain Voyage for 1250 *l.* It is required to know how much of the ſaid Freight is due to the ſeveral Partners. Therefore by the Rule of Three, as 2376*l.* the whole value of the Ship is to 1250 *l.* the Freight, ſo is the ſeveral reſpective ſhares put in by the ſaid Partners, to their reſpective ſhares in 1250 *l.* the Freight, which by multiplying and dividing I find to be as followeth.

Answer.

	l.	s.	d.
A ——	117	03	9
B ——	195	06	3
C ——	273	08	9
D ——	156	05	0
E ——	429	13	9
F ----	78	02	6
	1250		

If there happen to be a Loſs, the ſeveral Partners muſt bear a proportional ſhare in the Loſs, as they did in the Gain, which is to be found out after the ſame manner. For as the general Stock of the Partners is to the general Loſs, ſo is the particular ſhare in the Stock to the particular ſhare in the Loſs.

Example 4.

Three Merchants adventure to Sea 794 Pound. *Viz.* *A* hath 148 : 17 : 6, *B* hath 198 : 10 : 0, and *C* hath 446 : 12 : 6. Theſe Merchants have loſt out of their general

general Stock 213 *l.* 10 *s.* I require to know each mans share in the loss.

As 794 *l.* is to 213 *l.* 10 *s.* so is 148 *l.* 17 *s.* 6 *d.* to 40 *l.* 00 *s.* 7 *d.* $\frac{1}{2}$

As 794 *l.* is to 213 *l.* 10 *s.* so is 198 *l.* 10 *s.* 0 *d.* to 53 *l.* 7 *s.* 6 *d.*

As 794 *l.* is to 213 *l.* 10 *s.* so is 446 *l.* 12 *s.* 6 *d.* to 120 *l.* 1 *s.* 10 *d.* $\frac{1}{2}$.

Answer.

A hath lost	40	00	7 $\frac{1}{2}$.
B———	53	07	6
C———	120	01	10 $\frac{1}{2}$
	213	10	

Here in this Example *A* hath lost 40 *l.* 7 *d.* $\frac{1}{2}$, *B* hath lost 53 : 7 : 6, and *C* hath lost 120: 1 : 10: $\frac{1}{2}$; each bearing such a proportional share in the Loss as they have in the general Stock, and their respective shares in the Loss maketh up the just Sum of 213 *l.* 10 *s.* the general Loss as before.

CHAP. XX.

The Rule of Fellowship with Time.

THE Rule of Fellowship with Time, is when each Partners ſhare in the Stock hath a Relation to the Time that it hath remained in Stock. In this Rule you muſt multiply each Partners particular ſhare by the Time it hath continued in Stock; theſe ſeveral Products you may call for diſtinction ſake their new layings in. Then by the Rule of Three ſay, as the Sum of their new layings in is to the profit made, ſo is each mans particular new laying in to his particular ſhare of profit.

Example 1.

Two Partners join Stocks together, *viz.* *A* laid in the firſt of *April* 475 Pounds, and *B* laid in the firſt of *July* 525 Pounds, and by the laſt of *December* they had gained 360 Pound; now I deſire to know each mans

mans proportion of the profit anſwerable to his ſhare in Stock and Time.

A hath for 9 Months 475
B hath for 6 Months 525

1000

A ſhare multiplied by his Time is 4275
B ſhare multiplied by his Time is 3150

7425

As	is to	ſo is	to			
7425	360	4275	207	5	5	$\frac{1}{4}$: $\frac{6075}{7425}$
7425	360	3150	152	14	6	$\frac{1}{2}$: $\frac{1350}{7425}$

A ſhare for 475*l.* 9 *mon.* is 207:5:5:$\frac{1}{4}$ $\frac{6075}{7425}$
B ſhare for 525*l.* 6 *mon.* is 152:14:6:$\frac{1}{2}$ $\frac{1\ 25}{7245}$

Total Sum is 360

Example 2.

Two Partners are reſolved to make a Stock together, *viz.* *A* putteth in 380 *l.* the firſt of *May*, and *B* cannot put any thing in till the firſt of *Auguſt* next. I

 demand

demand how much *B* ought to put int, o receive $\frac{1}{2}$ of the profit at the years end.

Multiply *A* share 380 by 8 Months, the time his Mony abideth in Company, the Product thereof is 3040 *l.* for his new laying in. Now because *B* putteth in nothing until the first of *August*, his Mony will lie in but 5 Months. Divide 3040 by 5, and thereof will come 608 *l.* and so much must *B* lay in to receive $\frac{1}{2}$ of the profit, as was required.

Example 3.

Two Partners joined together in a Stock of 750 Pound, by which Stock they gained 240 Pound, which put to the Stock maketh 990 *l.* *A* his Mony was in 12 Months, and *B* his Mony was in 8 Months; when they divided the Mony, *A* received 671 *l.* 8 *s.* 6 *d.* $\frac{3}{4}$ and $\frac{3}{7}$, and *B* received 318 *l.* 11 *s.* 5 *d.* 0 *f.* $\frac{4}{7}$. I require to know how much each mans Stock was at first? Then by the Rule of Three, if 12 Months give 750, 8 Months will give 500; there the Stock of *A* first put in was 500, which subtracted from 750, there remains the Stock of *B*, as was required.

Exam-

Example 4.

Three Graziers hire a piece of Ground for 37 : 10. *A* put into the ſaid Ground 60 head of Oxen 15 days, *B* put into the ſaid piece of Ground 48 head of Oxen 21 days, and *C* put in 75 head of Oxen 12 days: I deſire to know how much each Grazier muſt pay.

	Oxen.	*days.*	
A	60	15	900
B	48	21	1008
C	75	12	900
			2808

If	give *l.*	*s.*	what will	*l.*	*s.*	*d.*		
2808	37	10	900	12	0	4	$\frac{1}{2}$	$\frac{1296}{2808}$
2808	37	10	1008	13	9	2	$\frac{3}{4}$	$\frac{216}{2808}$
2808	37	10	900	12	0	4	$\frac{1}{2}$	$\frac{1296}{2808}$

	l.	*s.*	*d.*		
A is to pay	12	0	4	$\frac{1}{2}$	$\frac{1296}{2808}$
B is to pay	13	9	2	$\frac{3}{4}$	$\frac{216}{2808}$
C is to pay	12	0	4	$\frac{1}{2}$	$\frac{1296}{2808}$
	37	10	0	0	

Which three ſeveral Sums being added together make 37 *l.* 10 *s.* which is the Sum the three Graziers are to pay among themſelves.

Example 5.

Three Merchants entred in a Trade of Company, as *A*, *B*, *C*, and put in ſeveral Sums of Mony for a Stock. *A* put in the firſt of *January* 250 *l.* and the firſt of *July* following he taketh out again 40 *l.* *B.* layeth in the firſt of *April* 425 *l.* and the firſt of *September* following he puts in 75 *l.* *C* laid in the firſt of *June* 360 *l.* and the firſt of *September* following he took out again 60 *l.* at the years end they found they had gained 275 *l.* I require to know how much each Partner ſhall have of the ſaid 275 *l.* gained.

Anſwer. Firſt multiply the mony that *A* laid in which was 250 *l.* by 12 Months, the time it continued in Stock, the Product thereof is 3000 *l.* from thence ſubtract 6 times 40 *l.* which is 240, for the mony which he took out again, and there doth remain 2760, which is the juſt laying in of *A*. Then multiply 425 *l.* the mony *B* paid,

paid, by 9 Months his time of continuance, the Product thereof is 3825, whereto add 4 times 75 *l.* which is 300, for the mony he laid in more the first of *September*, the Sum whereof is 4125, the second man *B* his layings in. Then for the mony that *C* paid which was 360 *l.* multiply by 7 Months his time, the Product thereof is 2520, from whence subtract 4 times 60 *l.* for the mony *C* took out the first of *September* which is 240, and there doth remain 2280 the third man *C* layings in.

A	his new layings in	2760
B	———————	4125
C	———————	2280
		9165

Then according to the Instructions of the first Example of this Chapter, add all the new layings in together, the Sum whereof is 9165, then by the Rule of Three the several Operations are as follow.

As	is to	so is	to				
l.	*l.*	*l.*	*l.*	*s.*	*d.*	*f.*	
9165	275	2760	82	16	3	2	$\frac{4172}{9165}$
9165	275	4125	123	15	5	1	$\frac{5535}{9165}$
9165	275	2280	68	08	2	3	$\frac{8625}{9165}$

A is to have	82	16	3	2	$\frac{4170}{9165}$
B ———————	123	15	5	1	$\frac{5535}{9165}$
C ———————	68	08	2	3	$\frac{8625}{9165}$
	275				

Which ſhares aforeſaid being added all together make up the ſum of the whole gain 275.

The Proof of this Rule is not different from that of Fellowſhip without Time laid down in the laſt Chapter.

CHAP. XXI.

Of Intereſt Simple and Compound, Purchaſes and Valuation of Annuities.

INtereſt is of two Kinds, Simple and Compound.

Simple Intereſt is when it is required ſo much *per Cent.* for ſo many years.

Compound Intereſt is as much as to ſay, Intereſt upon Intereſt, that is, you add the Intereſt

Intereſt every year to the Principal, and the next year you accompt Intereſt for their Sum being added both together.

Of Simple Intereſt.

Let it be required to know, if the Intereſt of 100 *l.* for 12 Months be 6 *l.* what ſhall the Intereſt of 375 *l.* be for the ſame time.

Example 1.

For the effecting this Operation by the Rule of Practice, work thus. It is here required to know the Intereſt of 375 *l.* at 6 *per Cent.* I therefore multiply 6 *l.* by 3, the Product thereof is 18 *l.* which is the Intereſt of 300 *l.* but there is 75 *l.* more to know the Intereſt of, which is three quarters of a hundred, that is, of 100, the half whereof is 50 *l.* the quarter 25 *l.* which make up 75 *l.* therefore under 18 *l.* I ſet down 3 *l.* the half of 6 *l.* and 1 *l.* 10 *s.* the quarter of 6 *l.* and add all theſe together their Sum is 22 *l.* 10 *s.* the Intereſt of 375 *l.* for 12 Months as was required.

18	
3	
1	10
22	10

Ex-

Example 2.

I desire to know if the Interest of 100 *l.* for 12 Months be 6 *l.* what shall the Interest of 450 *l.* be for 9 Months.

This question may be answered by two Operations of the Rule, as followeth.

If	require	what shall	answer
100 *l.*	6 *l.*	450 *l.*	27 *l.*
12 *mon.*	27 *l.*	9 *mon.*	20 : 05

But by the first Example of the Double Rule of Three, you do this and such like questions at one Operation. Thus

Say, if 100 *l.* for 12 Months gains 6 *l.* what shall 450 *l.* gain for 9 Months?

Set down the several numbers given in order as follow with their denominations over head.

The Operation is thus, you have here five numbers given to find out a sixth proportional, wherein 100 *l.* is the first Term, 12 the second, 6 the third, 450 and 9 the fifth Term.

Therefore multiply the two first Terms, *viz.* 100 and 12 together, the Product thereof

thereof is 1200, then multiply the three last Terms, *viz.* 60, 450 and 9 into one

Pounds.	*mon.*	*Interest.*	*Pounds.*	*mon.*
100 *l.*	12	6 *l.*	450	9
12			9	
1200			2700	
			6	
		12|00)	243|00 (20 *l.* 5 *s.*	
			24	
			03	

another, and the Product thereof will be 24300, which is the Dividend to be divided by the Divisor 1200; now because the Divisor and Dividend have each two Cyphers, therefere I cut off the said Cyphers, and there remains 12 for the Divisor, and 243 for the Dividend, which being divided the Quotient is 20, which is so many Pounds, but there remains 3, which being the quarter of 12 I set down in the Quotient 5 *s.* So I find the Interest of 450 *l.* for 9 Months is 20 *l.* 5 *s.* at the Rate of 6 *l. per* 100 *l.* as before.

But to avoid Fractions in this manner of working, and to find out the true and exact

exact Interest of any Sum of Mony propounded, not only in Months but in days, observe the following Directions.

Reduce your Interest, whether it be 6 *l.* 7 *l.* or 8 *l.* into Pence as you see.

6 *l.*	7 *l.*	8 *l.*
20	20	20
120	140	160
12	12	12
240	280	320
120	140	160
1440	1680	1920

I likewise convert the given numbers of Time into Days, and because the Year doth contain 365, and 6 Hours, it being better to allow more than less, I therefore do reckon 366 Days.

Example 3.

Let it be required to know the Interest of 360 *l.* for 40 days, at 6 *per Cent. per. An.* set down the given numbers as you see; then

then multiply the firſt and ſecond number together, *viz.* 100 and 366, the Product thereof is 36600, then multiply the three

Pounds.	*Days.*	*Intereſt.*	*Pounds.*	*Days.*
100	366	1440	360	40

366
100
36600

1440
360
86400
4320
518400
40
20736000

12 s. d.

366 207360 (566 $\frac{204}{366}$ 47 2 $\frac{204}{366}$
1830 48
2436 86
2196 84
2400 2
2196
204

last numbers together, and their Product will be 20736000; make the former number 36600 your Divisor, and 20736000 your Dividend; but because both the Divisor and Dividend do contain each two Cyphers, cut off two Cyphers from both Divisor and Dividend, then 366 will be your Divisor, and 207360 your Dividend, and the Quotient of such Division will give 566 Pence $\frac{204}{366}$, which by Reduction doth make 47 *s.* 2 *d.* $\frac{204}{366}$, and so much is the exact Interest of 360 Pounds for 40 days at 6 *l. per Cent.*

When the given Sum whose Interest you desire to know, doth consist of several Denominations, work according to the following directions.

Example 4.

I desire to know the Interest of 1236 *l.* 16 *s.* 8 *d.* for 12 Months or a whole Year.

By the Rule of Three.

If 100 *l.* give 6 *l.* what will 1236 *l.* 16 *s.* 8 *d.* give.

Or thus, set down the given number whose Interest you do require 1236 : 16 : 8, and multiply it by 6, as you see, setting and

down the Product of each Denomination multiplied by 6, as you see.

	1236	16	8
			6
Six Eight Pences are——		4	0
Six times 16 Shillings——	4	16	0
Six times 1236 Pounds——	7416	00	0
Total is	7421	00	0

Take away the two figures towards the right hand, or else make a separation between them, and then it will be 74 *l.* and 21 hundred parts now to find out the value of this 21 hundred parts, you must multiply it by 20, and by taking two figures from the Product it makes, 4 Shillings 20 parts, multiply this 20 parts by 12, doing as before, you have 2 *d.* and 40 parts. Lastly multiply this 40 parts by 4, and your Product will be 1 Farthing, $\frac{60}{100}$ parts of a Farthing. So the exact Interest of 1236 : 16 : 8 for a Year is 74 *l.* 4 *s.* 2 *d.* 1 *f.* $\frac{60}{100}$.

		21
		20
s.	4	20
		12
		40
d.	2	0
		40
		4
f.	1	60

By

By this following Table you may with more expedition and ease find out the true and exact interest of any Sum of mony given, wherein take notice that the Penny is divided into 100 parts, of which $\frac{25}{100}$ is the value of 1 Farthing, $\frac{50}{100}$ the value of of a half penny, and $\frac{75}{100}$ the value of three farthings.

A

A Table of Interest at 6 *l.* *per Cent.*

	1 Day.			*2 Days.*			*4 Days.*		
	s.	*d.*	*c.*	*s.*	*d.*	*c.*	*s.*	*d.*	*c.*
1									
5			1			2			4
10			2			4			7
15			3			6			11
1			4			8			15
2			8			16			32
3			12			24			48
4			15			31			62
5			19			39			78
6			23			47			94
7			27			55		1	10
8			31			63		1	26
9			35			71		1	42
10			39			78		1	56
20			79		1	58		3	12
30		1	18		2	36		4	68
40		1	58		3	15		6	24
50		1	97		3	94		7	80
60		2	36		4	72		9	36
70		2	76		5	51		10	92
80		3	15		6	31	1	0	48
90		3	55		7	10	1	2	04
100		3	94		7	89	1	3	60
200		7	89	1	3	78	2	7	20
300		11	83	1	11	67	3	10	80
400	1	03	78	2	7	56	5	2	40
500	1	07	72	3	3	45	6	6	00

A Table of Interest at *6 per Cent.*

	8 *Days.*			10 *Days.*			20 *Days.*		
	s.	*d.*	*c.*	*l. s.*	*d.*	*c.*	*l. s.*	*d.*	*c.*
1			1			1			3
5			8			10			19
10			15			19			39
15			23			29			59
1			30			39			78
2			64			78		1	57
3			96		1	17		2	36
4		1	24		1	57		3	15
5		1	56		1	97		3	94
6		1	88		2	36		4	73
7		2	20		2	76		5	52
8		2	52		3	14		6	31
9		2	84		3	55		7	10
10		3	12		3	94		7	89
20		6	24		7	89	1	3	78
30		9	36		11	83	1	11	67
40	1	0	48	1	3	77	2	7	56
50	1	3	60	1	7	72	3	3	45
60	1	6	72	1	11	66	3	11	34
70	1	9	84	2	3	61	4	7	23
80	2	0	96	2	7	55	5	3	12
90	2	4	8	2	11	50	5	11	01
100	2	7	20	3	3	45	6	6	90
200	5	2	40	6	6	90	13	1	80
300	7	9	60	9	10	36	19	8	71
400	10	4	80	13	1	81	26	3	61
500	13	0	00	16	5	26	32	10	52

A Table of Interest at 6 *per Cent.*

	1 *Day.*			2 *Days.*			4 *Days.*		
	s.	*d.*	*c.*	*s.*	*d.*	*c.*	*s.*	*d.*	*c.*
600	1	11	67	3	11	34	7	9	60
700	2	3	61	4	7	23	9	1	20
800	2	7	56	5	3	12	10	4	80
900	2	11	50	5	11	1	11	8	40
1000	3	3	45	6	6	90	13	0	00
2000	6	6	90	13	1	80	26	0	00
3000	9	10	36	19	8	70	39	0	00
4000	13	1	80	26	3	60	52	0	00
5000	16	5	25	32	10	50	65	0	00
6000	19	8	71	39	5	40	78	0	00
7000	23	0	16	46	0	30	91	0	00
8000	26	3	61	52	7	20	104	0	00
9000	29	7	06	59	2	10	117	0	00
10000	32	10	51	65	9	00	130	0	00
	1 *Month.*			2 *Months.*			3 *Months.*		
1			6			12			18
5			30			60			90
10			60		1	20		1	80
15			90		1	80		2	70
1		1	20		2	40		3	60
2		2	40		4	80		7	20
3		3	60		7	20		10	80
4		4	80		9	60	1	2	40
5		6	00	1	0	00	1	6	00
6		7	20	1	2	40	1	9	60
7		8	40	1	4	80	2	1	20
8		9	60	1	7	20	2	4	80
9		10	80	1	9	60	2	8	40

A Table of Interest at 6 *per Cent.*

	8 Days			*10 Days.*			*20 Days.*		
	s.	*d.*	*c.*	*l. s.*	*d.*	*c.*	*l. s.*	*d.*	*c.*
600	15	7	20	19	8	71	39	5	42
700	18	2	40	23	0	16	46	0	32
800	20	9	60	26	3	62	52	7	23
900	23	4	80	29	7	07	56	2	13
1000	26	0	00	32	10	52	65	9	04
2000	52	0	00	65	9	04	131	6	09
3000	78	0	00	98	7	57	197	3	13
4000	104	0	00	131	6	09	263	0	17
5000	130	0	00	164	4	61	328	9	22
6000	156	0	00	197	3	13	394	6	26
7000	182	0	00	230	1	65	460	3	31
8000	208	0	00	263	0	17	526	0	35
9000	234	0	00	295	10	69	591	9	39
10000	260	0	00	328	9	21	657	6	43

	6 Months.			*9 Months.*			*12 Months.*		
	s.	*d.*	*c.*	*s.*	*d.*	*c.*	*s.*	*d.*	*c.*
1			36			54			72
5		1	80		2	70		3	60
10		3	60		5	40		7	20
15		5	40		8	10		10	80
1		7	20		10	80	1	2	40
2	1	2	40	1	9	60	2	4	80
3	1	9	60	2	8	40	3	7	20
4	2	4	80	3	7	20	4	9	60
5	3	0	00	4	6	00	6	0	00
6	3	7	20	5	4	80	7	2	40
7	4	2	40	6	3	60	8	4	80
8	4	9	60	7	2	40	9	7	20
9	5	4	80	8	1	20	10	9	60

A Table of Interest at 6 *per Cent*.

	1 *Month.*			2 *Month.*			3 *Months.*		
	l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
10		1	0		2	0		3	0
20		2	0		4	0		6	0
30		3	0		6	0		9	0
40		4	0		8	0		12	0
50		5	0		10	0		15	0
60		6	0		12	0		18	0
70		7	0		14	0	1	1	0
80		8	0		16	0	1	4	0
90		[illegible]	0		18	0	1	7	0
100	0	10	0	1	0	0	1	10	0
200	1	0	0	2	0	0	3	0	0
300	1	10	0	3	0	0	4	10	0
400	2	0	0	4	0	0	6	0	0
500	2	10	0	5	0	0	7	10	0
600	3	0	0	6	0	0	9	0	0
700	3	10	0	7	0	0	10	10	0
800	4	0	0	8	0	0	12	0	0
900	4	10	0	9	0	0	13	10	0
1000	5	0	0	10	0	0	15	0	0
2000	10	0	0	20	0	0	30	0	0
3000	15	0	0	30	0	0	45	0	0
4000	20	0	0	40	0	0	60	0	0
5000	25	0	0	50	0	0	75	0	0
6000	30	0	0	60	0	0	90	0	0
7000	35	0	0	70	0	0	105	0	0
8000	40	0	0	80	0	0	120	0	0
9000	45	0	0	90	0	0	135	0	0
10000	50	0	0	100	0	0	150	0	0

A Table of Interest at 6 *per Cent.*

	6 *Months.*			9 *Months.*			12 *Months.*		
	l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
10		6	0		9	0		12	0
20		12	0		18	0	1	4	0
30		18	0	1	7	0	1	16	0
40	1	4	0	1	16	0	2	8	0
50	1	10	0	2	5	0	3	0	0
60	1	16	0	2	14	0	3	12	0
70	2	2	0	3	3	0	4	4	0
80	2	8	0	3	12	0	4	16	0
90	2	14	0	4	1	[illegible]	5	08	0
100	3	0	0	4	10	0	6	0	0
200	6	0	0	9	0	0	12	0	0
300	9	0	0	13	10	0	18	0	0
400	12	0	0	18	0	0	24	0	0
500	15	0	0	22	10	0	30	0	0
600	18	0	0	27	0	0	36	0	0
700	21	0	0	31	10	0	42	0	0
800	24	0	0	36	0	0	48	0	0
900	27	0	0	40	10	0	54	0	0
1000	30	0	0	45	0	0	60	0	0
2000	60	0	0	90	0	0	120	0	0
3000	90	0	0	135	0	0	180	0	0
4000	120	0	0	180	0	0	240	0	0
5000	150	0	0	225	0	0	300	0	0
6000	180	0	0	270	0	0	360	0	0
7000	210	0	0	315	0	0	420	0	0
8000	240	0	0	360	0	0	480	0	0
9000	270	0	0	405	0	0	540	0	0
10000	300	0	0	450	0	0	600	0	0

The Use of the former Table.

Let it be required to find the Intereſt of 975 *l.* for 12 Months or a Year. Firſt, I find the Intereſt of 900 *l.* for 12 Months to be 54 *l.* which I ſet down, then I find the Intereſt of 70 *l.* for the ſame time to be 4 *l.* 4 *s.* which I ſet under the 54 *l.* next I find the Intereſt of 5 *l.* for the like time to be 6 *s.* which I likewiſe ſet down, as you ſee.

	l.			*l.*	*s.*	
The Intereſt of	900	for 12 *mon.* is		54	00	00
	70			04	04	00
	5			00	06	00
				58	10	00

Add theſe ſeveral Sums together, and their total Sum will be 58 *l.* 10 *s.* which is the exact Intereſt of 975 *l.* for 12 months at 6 *l.* *par Cent.* as was required.

Of Compound Intereſt.

Compound Intereſt is when Intereſt upon Intereſt is reckoned on any Sum of Mony.

Example.

Let it be required to know the Intereſt of 200 *l.* for 3 years, reckoning Intereſt upon Iutereſt, to effect which by the Rule of Three, obſerve theſe following proportions.

As	is to	ſo is	to	
100	006	200	012	1. *year.*
100	006	212	024	2. *year.*
100	006	224:14:4:3:038:47:0:2		3. *ye.*

As by the following Example doth appear.

In this Operation I ſay at firſt, if 100 *l.* give 106 *l.* Intereſt and Principal for one year, what ſhall 200 *l*? and by Multiplication I reduce 200 *l.* into the loweſt Denomination, which gives me 192000 farthings, I multiply theſe farthings by my ſecond Term 106, the Product is 20352000, and becauſe I am to divide by 100, I cut off the two Cyphers towards the right hand, which is all one and the ſame, and there doth remain 203520 farthings, which reduced makes

If 100 give 106, what will 200

```
                200
                 20
              -----
               4000
                 12
              -----
               8000
              4000
      -----------------------
              48000
                  4
      -----------------------
             192000
                106
      -----------------------
            1152000
            000000
           192000
      -----------------------
           203520(00   1. Year.
                106
      -----------------------
           1221120
           000000
          203520
      -----------------------
          215731(20    2. Year.
                106
      -----------------------
          1294386
          000000
         215731
      -----------------------
         228674(86     3. Year.
```

makes 212 *l.* for the Principal and Intereſt of 200*l.* the firſt year, the Proportion now lies. If 100 *l.* give 106 *l.* what will 212 *l.* give? and by the foregoing Operation I find 212 *l.* to contain 203520 Farthings, which I again multiply by 106, the Product thereof is 21573120, cutting off two figures as before, there remains 215731 Farthings, which reduced make 224 *l.* 14*s.* 4 *d.* 3 *f.* the Principal and Intereſt upon Intereſt of 200 Pound for two years. Laſtly, I multiply 215731 by 106, the the Product is 228674(86, cutting off two figures as before there remains 228674 Farthings, which reduced gives 238 *l.* 4 *s.* $\frac{1}{2}$ for the Principal and Intereſt upon Intereſt of 200*l.* for three years. And in like manner muſt you work if time be longer, ſo that if you multiply 228674 Farthings by 106, and from the Product thereof cut off two figures towards your right hand, the Remainer gives you the number of farthings contained in the Principle and Intereſt upon Intereſt of 200 *l.* for 4 years.

But becauſe queſtions of Intereſt upon Intereſt require an Operation for each year, I have therefore inſerted the following Table.

A

A Table shewing the Principal and Interest upon Interest for one Pound for any Term under 31 Years.

Years.	l.	s.	d.	f.
1	1	1	2	1
2	1	2	5	2
3	1	3	9	3
4	1	5	3	0
5	1	6	9	0
6	1	8	4	2
7	1	10	0	3
8	1	11	10	2
9	1	13	9	2
10	1	15	9	3
11	1	17	11	2
12	2	0	3	0
13	2	2	7	3
14	2	5	2	2
15	2	7	11	1
16	2	10	9	2
17	2	13	10	1
18	2	17	1	0
19	3	0	6	0
20	3	4	1	3
21	3	7	11	3
22	3	12	0	2
23	3	16	4	1
24	4	0	11	1
25	4	5	9	1
26	4	10	11	0
27	4	16	4	1
28	5	2	1	2
29	5	8	3	0
30	5	14	8	3
31	6	1	7	1

The firſt Column of this Table is the Column of years from 1 to 31, and over againſt each number of years doth ſtand the Sum that 20 Shillings or one Pound doth come to at Intereſt upon Intereſt for the ſame time.

Suppoſe it were required to know by this Table the increaſe of 50 *l.* for 12 years at Intereſt upon Intereſt. Look in the Table over againſt 12 years and you will find 2 *l.* 0 *s.* 3 *d.* which is the increaſe of 1 Pound for 12 years, which multiplied by 50, as you ſee, *viz.*

	l.	*s.*	*d.*
	2	0	3
			50
50 Times 3 *d.* is—— ——		12	6
50 Times 2 *l.* is—— ——	100		
Total is	100	12	6

So that 100 *l.* 12 *s.* 6 *d.* is the increaſe of 50 *l.* for 12 years, allowing Intereſt upon Intereſt.

Of Purchases and Annuties.

If you would purchase any Sum of Mony to be paid you any number of years to come, you must first know what it is worth in ready mony, allowing Interest upon Innerest. To effect this say, As 106 *l.* is to 100 *l.* so 100 *l.* to the present worth of 100 *l.* to be paid at 12 Months or a year. Then for the second year say, as 106 *l.* is to 100 *l.* so is the present worth of one year to the present worth for two years, and in like manner is the present worth of any Sum of Mony given found out for any number of years to come, as by the following Example doth more plainly appear.

Example.

Let it be required to know how much 50 *l.* to be paid at two years end is worth in ready mony, by the Rule of Three according to the preceding Instructions say,

As

As 106 *l.* is to 100 *l.* so is 50 *l.*

```
               100
             ------
    106)  5000|00(47:169
          424 : : :
          ------
           760
           742
          ------
            180
            106
          ------
             740
             636
          ------
             1040
              954
          ------
               86
```

Here you see 50 *l.* to be paid at one years end is worth in ready money 47 *l.* 169 parts, or 3 *s.* 4 *d.* Then for the second year make this last Sum found out 47:169, your third number, saying,

As

As 106 *l.* to 100 *l.* so is 47 : 169

```
             100
         ──────────
106)  47:16900(44:499
      424
      ─────
       476
       424
       ─────
        529
        424
        ─────
        1050
         954
         ─────
          960
          954
          ─────
            6
```

By this last Operation the fourth number found out is 44:499, by which you see that 50 *l.* to be paid at the end and expiration of two years is worth no more than 44 Pound 10 Shillings in ready mony, and in like manner if you would know the present worth of 50 *l.* at the end and

ration of three years, make 44:499 your third number; saying,

As 106 *l.* is to 100 *l.* so is 44:499 to 41:980.

But to avoid this trouble I have inserted the following Table shewing the present worth of one Pound in ready mony, to be paid any number of years under 31, and if you know the present worth of one Pound, by Multiplication you may know the present worth of any other Sum of Mony.

Annexed to this Table is another Table, shewing the true value of 1 *l.* Annuity to continue 31 Years in ready mony, whereby you may easily know the true value of any Purchase to continue the same Term of years.

A

A necessary Table shewing the present worth of 1 *l.* to be paid any number of years under 31, at 6 *l.* *per Cent.*

Years.	*l.*	*s.*	*d.*	
1	18	10	2	94339
2	17	9	2	88999
3	16	9	2	83962
4	15	10	0	79209
5	14	11	1	74726
6	14	1	1	70496
7	13	3	2	66506
8	12	6	2	62741
9	11	10	0	59190
10	11	2	0	55839
11	10	6	2	52678
12	9	11	1	49697
13	9	4	2	46884
14	8	10	0	44230
15	8	4	1	41726
16	7	10	2	39365
17	7	5	0	37136
18	7	0	0	35034
19	6	7	1	33051
20	6	2	3	31181
21	5	10	2	29415
22	5	6	2	27750
23	5	2	3	26180
24	4	11	1	24698
25	4	7	2	23300
26	4	4	3	21981
27	4	1	3	20737
28	3	11	0	19563
29	3	9	1	18453
30	3	5	3	17411

A Table shewing the true value of 1 *l.* Annuity to continue any number of years under 31, in ready Mony at 6 *l.* per Cent.

Years.	*l.*	*s.*	*d.*	*q.*	*Decimals.*	
1		18	10	2	0	94340
2	1	16	08	0	1	83339
3	2	13	05	2	2	67301
4	3	09	03	2	3	46510
5	4	04	03	0	4	21236
6	4	18	04	1	4	91732
7	5	11	07	3	5	58238
8	6	04	02	1	6	20979
9	6	16	00	1	6	80169
10	7	07	02	1	7	36008
11	7	17	08	3	7	88687
12	8	07	08	0	8	38384
13	8	17	00	2	8	85268
14	9	05	10	3	9	29498
15	9	14	03	0	9	71224
16	10	02	01	2	10	10589
17	10	09	06	2	10	47725
18	10	16	06	2	10	82760
19	11	03	02	0	11	15811
20	11	09	04	3	11	46992
21	11	15	03	1	11	76405
22	12	00	10	0	12	04158
23	12	06	00	3	12	30337
24	12	11	00	0	12	55035
25	12	15	07	2	12	78355
26	13	00	00	2	13	00316
27	13	04	02	2	13	21053
28	13	08	01	2	13	42616
29	13	11	10	3	13	59071
30	13	15	04	2	13	76482

The Use of the foregoing Tables.

It is required to know the present value in ready Mony of 36 *l.* Annuity or Leafe that is to continue 21 years.

By the former Table you find 1 *l.* Annuity or Leafe to continue 21 years is worth 11 *l.* 15 *s.* 3 *d.* 1 *f.* therefore the anfwer to your queftion muft be 36 times 11 *l.* 15 *s.* 3 *d.* 1 *f.*

	l.	*s.*	*d.*	*f.*
Therefore ————————	11	15	3	1
Multiplied by ————				36
36 times 1 Farthing is—			9	0
36 times 3 Pence is——		9	0	0
36 times 15 Shillings is-	27	0	0	0
36 times 11 Pounds is—	396	0	0	0
Total Sum is —	423	9	9	0

By Decimals thus, look for the Decimal value of one Pound Annuity or Leafe for 21 Years, which you will by the fame Table find to be 11:76405, which multiply by 36 Pound, the Product will be 423

423 Pound, 50580, which in value is ten Shillings, being three Pence more than the other.

11:76405
36

———

70:58430
352:9215

———

423:50580

Therefore the Purchase of 36 Pound for 21 years is worth 423 *l.* 9 *s.* 9 *d.* as was required.

CHAP. XXII.

Of Rebate or Discount.

REbate or Discount is when mony is due at a certain time, as at 2, 3, 6 or 12 Months, and the person to whom the mony is payable may sometimes have such occasion for his mony as to desire it before it be due; the person that is to pay the mony hath no reason to pay his mony before it be due, without some considera-

tion

tion of Rebate or Discount for so much time at 6, 7 or 8 *per Cent.* as they do agree.

Observe this as a general Rule, that upon Rebatements there must be no more mony paid down than would augment it self unto the whole Sum due, if it were put forth to Interest for so much time as it is paid or received before hand.

Example 1.

Let it be required to know the Rebate of 250 *l.* for 12 Months at 6 *per Cent.* Then by the Rule of Three say,

As 106 is to 100, so is 250 *l.*

100

106) 25000(235:849

212

380

318

620

530

901

848

520

424

960

954

6

	l.	s.	d.
Mony to be laid down —	235	16	11 $\frac{1}{4}$
Mony rebated or discounted —	14	03	00 $\frac{1}{4}$
Total	250		

By which I gather that the Interest of 235 : 16 : 11 : $\frac{3}{4}$ for 12 Months at 6 *l.* *per Cent.* is 14 : 3 : 0 : $\frac{1}{4}$, which makes up the whole debt 250 Pound, as before.

Example 2.

I demand how much I must rebate or discount for 165 Pounds for 9 Months at 8 Pound *per Cent.* simple or bare Interest.

Say

Say by the Rule of Three.

As 106*l.* is to 100*l.* so is 165*l.*

20

3300
100

106 330000 (3113
318... 155:13:2

120
106

140
106

340
318

22

	l.	*s.*	*d.*
Total Sum due is ————	165	00	00
To be paid ————	155	13	02
At 8 l.per Cent. *for* 9 *months is rebated* —	9	6	10

Example

Example 3.

I demand the Diſcount or Rebate of 548 *l.* for *6* Months at *7 per Cent.* ſimple Intereſt.

Say by the Rule of Three.

As 103 10	is to 100,	ſo is 548
20	20	20
2070	2000	10960
12	12	12
4140	24000	21920
2070		10960
24840		131520
		24000
		526080000
		263040
		3156480000

```
                 12
24840)315648000(127072(10589(
   24840·····   12···      529:09:4
   ─────────────────────────────────
    67248         070
    49680          60
   ─────────────────────────────────
    175680        107
    173880         96
   ─────────────────────────────────
      180000      112
      173880      108
   ─────────────────────────────────
        61200       4
        49680
   ─────────────────────────────────
        11520
```

Total Sum due is ——— ———	548		
Paid down ——— ——— ———	529	09	04
Rebated for 6 Months at 6 l. per Cent. } —	18	10	08

Quest. Let it be required to know the Rebate of 500 *l.* for 9 *mon.* at 6 *l. per Cent.*

Example. To resolve this Question, you must find out the Interest of 500 *l.* for 9 Months, the Interest of 100*l.* for 9 Months or three quarters of a year is 4 *l.* 10 *s.* therefore the Interest of 500 *l.* for the same time must of necessity be 22 *l.* 10 *s.* now I say if 522 *l.* 10 *s.* give 500 *l.* what will 500 *l.* give.

522 *l.*

522:10 500 500
20 20 20

10450 10000 10000
12 12 12

20900 120000 120000
10450 120000

125400 2400000000
12

125400) 14400000000(114832
125400

186000
125400

606000
501600

1044000
1003200

408000
376200

318000
250800

67200

Here

Here you find the anſwer to the queſtion laſt ſtated, by the Quotient which doth give you 114832 Pence, which is reduced as followeth.

		20	*l.*	*s.*	*d.*
12)	114832	(9569|9	(478	09	04
	108	478			
	068				
	60				
	83				
	72				
	112				
	108				
	4				

At laſt we have found that if 522 *l.* 10 *s.* give 500 *l.* then 500 *l.* will give 478 *l.* 9 *s.* 4 *d.* which ſubtracted from 500 *l.* giveth 21 *l.* 10 *s.* 8 *d.* for the Rebate of 500 *l.* for 9 Months at *6 l. per Cent.*

This following Table will be of very great uſe for the ready caſting up of the Rebate of any Sum of Mony for any time propounded.

A Table of Rebate at 6 *per Cent.*

	1 *Month.*			2 *Month.*			3 *Months.*		
	l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
1			1			2			4
2			2			5			7
3			3			7			11
4			5			10		1	2
5			6		1	0		1	6
6			7		1	2		1	9
7			8		1	5		2	2
8			9		1	7		2	4
9			11		1	9		2	8
10		1	0		2	0		2	11
20		2	0		3	11		5	11
30		3	0		5	11		8	10
40		4	0		7	11		11	10
50		5	0		9	11		14	9
60		6	0		11	11		17	9
70		7	0		13	10	1	0	8
80		8	0		15	10	1	3	8
90		8	11		17	10	1	6	7
100		9	11		19	10	1	9	7
200		19	10	1	19	7	2	19	1
300	1	9	11	2	19	5	4	8	8
400	1	19	12	3	19	2	5	18	3
500	2	9	9	4	19	0	7	7	9
600	2	19	8	5	18	10	8	17	4
700	3	9	8	6	18	7	10	6	11
800	3	19	7	7	18	5	11	16	5
900	4	9	7	8	18	2	13	6	0
1000	4	19	6	9	18	0	14	15	7

A Table of Rebate at 6 *l. per Cent.*

	4 Months.			*5 Months.*			*6 Months.*		
	l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
1			5			6			7
2			9		1	0		1	2
3		1	2		1	6		1	9
4		1	7		1	11		2	4
5		1	11		2	5		2	11
6		2	4		2	11		3	6
7		2	9		3	5		4	1
8		3	2		3	11		4	8
9		3	6		4	5		5	3
10		3	11		4	11		5	10
20		7	10		9	9		11	8
30		11	9		14	8		17	6
40		15	8		19	6	1	3	4
50		19	7	1	4	5	1	9	2
60	1	3	6	1	9	3	1	14	11
70	1	7	5	1	14	0	2	0	9
80	1	11	4	1	19	0	2	6	7
90	1	15	4	2	3	11	2	12	5
100	1	19	3	2	8	9	2	18	3
200	3	18	4	4	17	7	5	16	6
300	5	17	8	7	6	4	8	14	9
400	7	16	11	9	15	1	11	13	0
500	9	16	1	12	3	11	14	11	3
600	11	15	3	14	12	8	17	9	6
700	13	14	6	17	1	6	20	7	9
800	15	13	9	19	10	3	23	6	0
900	17	12	11	21	19	0	26	4	3
1000	19	12	2	24	7	10	29	2	6

A Table of Rebate at 6 *per Cent.*

	7 *Months.*			8 *Months.*			9 *Months.*		
	l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
1			8			9			10
2		1	4		1	6		1	8
3		2	0		2	4		2	7
4		2	8		3	1		3	5
5		3	4		3	10		4	4
6		4	1		4	7		5	2
7		4	9		5	5		6	0
8		5	5		6	1		6	11
9		6	1		6	11		7	9
10		6	9		7	8		8	7
20		13	6		15	5		17	3
30	1	0	3	1	3	1	1	5	10
40	1	7	1	1	10	9	1	14	5
50	1	13	10	1	18	6	2	3	1
60	2	0	7	2	6	2	2	11	8
70	2	7	4	2	13	10	3	0	3
80	2	14	1	3	1	6	3	8	11
90	3	0	10	3	9	3	3	17	6
100	3	7	8	3	16	11	4	6	1
200	6	15	3	7	13	10	8	12	3
300	10	2	11	11	10	9	12	18	4
400	13	10	6	15	7	8	17	4	6
500	16	18	2	19	4	7	21	10	7
600	20	5	10	23	1	6	25	16	9
700	23	13	6	26	18	6	30	2	10
800	27	7	1	30	15	5	34	9	0
900	30	8	8	34	12	4	38	15	1
1000	33	16	4	38	9	3	43	1	2

A Table of Rebate at 6 *l.* per Cent.

	10 *Months.*			11 *Months.*			12 *Months.*		
	l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
1			11		1	0		1	2
2		1	11		2	1		2	3
3		2	10		3	2		3	5
4		3	9		4	2		4	6
5		4	9		5	3		5	8
6		5	8		6	3		6	9
7		6	8		7	4		7	11
8		7	7		8	4		9	1
9		8	7		9	5		10	2
10		9	6		10	5		11	4
20		19	1	1	0	10	1	2	8
30	1	8	7	1	11	3	1	14	0
40	1	18	1	2	1	8	2	5	3
50	2	7	7	2	12	2	2	16	7
60	2	17	2	3	2	7	3	7	11
70	3	6	8	3	13	0	3	19	3
80	3	16	2	4	3	5	4	10	6
90	4	5	9	4	13	10	5	1	10
100	4	15	3	5	4	3	5	13	2
200	9	10	6	10	8	6	11	6	5
300	14	5	9	15	12	10	16	19	7
400	19	0	11	20	17	1	22	12	10
500	23	16	2	26	1	4	28	6	0
600	28	11	5	31	5	7	33	19	3
700	33	6	8	36	9	10	39	12	5
800	38	1	11	41	14	1	45	5	8
900	42	17	2	46	18	5	50	18	10
1000	47	12	5	52	2	8	56	12	1

The Explanation of the foregoing Tables.

Let it be required to find the Rebate of 348 *l.* for five Months at *6 l. per Cent.*

In the foregoing Table I look in the Column of five Months and in the ſame

l.	*l.*	*s.*	*d.*
300	7	06	04
40	0	19	06
8	0	3	11
348	8	9	9

Column over againſt 300 *l.* I find 7 : *6* : 4, and againſt 40 *l.* I find 19 : *6*, and againſt 8*l.* I find 3*s.* 11*d.* which Sums I ſet down one under another, as in the Example; and by Addition I find the Rebate of 348 *l.* to be 8 *l.* 9 *s.* 9 *d.* And in like manner you muſt do for any greater or leſſer Sum.

CHAP.

CHAP. XXIII.

Equation of Payments.

THIS Rule teacheth how to bring the ſeveral Times appointed for the Paiment of a Sum of Mony due unto one Time for payment of the whole Sum. As admit, a Merchant doth owe 900 *l.* to be paid at three ſeveral payments, *viz.* 300 *l.* at three Months, 300 *l.* more at ſix Months, and 300 *l*, more at nine Months. But it is concluded by the Debtor and Creditor to pay the Mony all together at one Time. It is required to know the Time the whole Sum ought to be paid in, that neither Debtor nor Creditor may be loſers.

The Rule.

Multiply each Payment by his own Time, add the ſeveral Products together, and divide the Sum thereof by the whole Debt, the Quotient ſheweth you the exact Time for payment of the whole Sum.

300	multiplied by	3	Months is	900
300	multiplied by	6	Months is	1800
300	multiplied by	9	Months is	2700
				5400

The ſeveral Products added together make 5400, which divided by 900 *l.* the whole Debt, the Quotient gives 6 Months for the exact Payment of the whole Sum at one Payment.

The Proof.

Firſt find out what the Intereſt of the Mony doth come to, that ſhould have been paid before the time found out for payment of the whole Sum. Likewiſe find out what the Intereſt of the Mony comes to, that ſhould have been paid after the ſaid time found out for payment of the whole Sum; and if the Intereſt of the Mony paid before be equal to the Intereſt of the Mony paid after, then the time found out is the exact time for paiment of the whole Sum.

Exam-

Example.

In the foregoing Example where 300 *l.* is to be paid at 3 Months, 300 *l.* more at 6 Months, and 300 *l.* more at 9 Months, it is found out by the ſaid Operation that 6 Months is the exact time for payment of the whole Sum of 900 *l.* To prove this, there was 300 *l.* to be paid at 3 Months, but is not paid unto 6 Months, which is 3 Months longer, and the Intereſt of 300 *l.* for 3 Months at 6 *l. per Cent.* is 4 *l.* 10 *s.*

The 300 *l.* paid at 6 Months is the time equated or found out.

The other 300 *l.* to be paid at 9 Months is to be now paid at 6 Months, which is 3 Months before his time of Payment, the Intereſt whereof for 3 Months is 4 *l.* 10 *s.* as before, therefore 6 Months is the exact time for payment of the whole Sum of 900 *l.*

A Merchant oweth 750 *l.* to be paid at 4 ſeveral payments; 200 *l.* at 4 Months; 250 *l.* more at 8 Months, 150 *l.* more to be paid at 10 Months, and 150 *l.* more at 12 Months. I require to know what time the whole 750 *l.* ought to be paid in, that

that neither Debtor nor Creditor may be losers?

l.		l.
200	multiplied by 4 Months is	800
250	multiplied by 8 Months is	2000
150	multiplied by 10 Months is	1500
150	multiplied by 12 Months is	1800
		6100

750) 6100 (8 *Months* $\frac{2}{15}$ Facit.
6000

100

The several Sums of payment being multiplied by their respective time, the Sum of their Products is 6100, which divided by 750, the Quotient gives eight Months and $\frac{2}{15}$ for the time of payment altogether.

There is owing to a Merchant 480 *l.* to be paid 120*l.* ready mony, 120*l.* at four Months, 120 *l.* more at eight Months, and 120 *l.* more at 12 Months. I demand the exact time for payment of the whole Sum 480 *l.* so that neither Debtor nor Creditor

Creditor may have any advantage nor be damnified.

l.		*l.*
120	multiplied by 0 Months is	000
120	multiplied by 4 Months is	480
120	multiplied by 8 Months is	960
120	multiplied by 12 Months is	1440
		2880

480) 2880 (6 Months
2880

0

The ſeveral Products added together make 2880, which divided by the whole Sum 480 *l*. the Quotient giveth 6 Months, as was required.

CHAP. XXIV.

Of Tare, Tret and Cloff.

TAre, *Tret* and *Cloff* are allowances of Merchandize ſold by weight.

Tare is the allowance for the weight of the Cask, Cheſt, Bag, *&c.* wherein any Commodity is put.

Tret is an allowance of 4 pound weight, upon every ſubtle 100 pound weight; that is to ſay, to allow 104 pound for every 100 pound.

Cloff is an allowance of 2 pound upon every draught that doth exceed 336 pound, or 300 groſs weight.

Queſt. 1. If one ſubtle Hundred coſt 3 pound, what ſhall 2704 pound coſt?

By the Rule of Three ſay,

If 104 *l.* coſt 13 *l.* what ſhall 2704 *l.* coſt?

2704

```
        2704
           3
        ----
104)    8112  (78
        728
        ----
         832
         832
        ----
           0
```

By the Operation I find 2704 pounds weight to be worth 78 pound *Sterl.*

Quest. 2. If 100 *l.* be worth 13 *s.* 4 *d.* what will 2496 *l.* be worth, allowing 4 *l.* for every 100 for *Tret*?

Divide the given number 2496 by 26, because the 4 *l. Tret* is the 26. part of 104, and the Quotient will be 96, which is to be abated for the *Tret* out of 2496, and there will remain 2400 *l. nett* at 13 *s.* 4 *d. per* Hundred. Then by the Rule of Three say, If 100 cost 13 : 4, what will 2400 *l.* cost? the answer will be 1600 *l.* the answer to the question, as was required.

CHAP. XXV.

The Rule of Barter.

BArter teacheth how to sell Wares for Wares, or change one Merchandize for another.

As for Example.

There are two Merchants, *viz.* *A* and *B*, *A* hath 24 C. weight of Tobacco at 4 *d.* ½ *per* pound, and *B* hath Sugar at 7 *d. per* pound. I demand how much Sugar must *B* deliver to *A* for the Tobacco?

By the Rule of Three say,

If 1 *l.* of Tobacco cost 4 *d.* ½, what will 24 C.

4	112
18	
	448
	224
	2688
	18
	21504
	2688
	48384

```
          12        20       l.   s.
4)  48384  (12096  (1008   (50   8.
    4···    12··    100
    ----    ----    ----
    08       0096    08.
    8
    ----
    038
     36
    ----
      24
      24
    ----
       0
```

By the foregoing Operation you find that 24 *C.* will coſt 50 *l.* 8 *s.* Then ſay again,

If 7*d.* buy 1 pound of Sugar, how many pound will 50*l.* 8 *s.*

By multiplying and dividing you will find that 50 *l.* 8 *s.* will buy 1728 pound of Sugar at 7*d.* *per* pound, therefore *B* muſt deliver 1728 pound of Sugar to *A* at 7 *d.* *per* pound for 24 *C.* of Tobacco at 4 *d.* $\frac{1}{2}$, as was required.

If 7 *d.* buy 1 pound, what will 50 *l.* 8 *s.*

```
                      20
                    ------
                    1008
                      12
                    ------
                    2016
                   1008
                  -------
        7 d.      12096 (1728l.
                   7...
                  -------
                    50
                    49
                   ----
                    19
                    14
                   ----
                    56
                    56
                   ----
                     0
```

Two Merchants barter one with the other: *A* hath 128 Yards of Broad Cloth at 9 *s.* 6 *d.* and *B* hath Holland Cloth at 3 *s.* 4 *d. per* Ell. I demand how much Holland

Holland Cloth *B* must deliver to *A* for his 128 Yards of Broad Cloth?

By the Rule of Three say,

If 1 Yard of Broad Cloth cost *9 : 6* what cost 128 Yards?

9 : 6	128 *Yards*.
12	114
114	512
	128
	128
	14592

12) 14592 (121 (*6* (*60 l. 16 s.*
12   60

25
24

19
12

72
72

0

If

If 3 *s.* 4 *d.* buy one Ell of Holland Cloth, what will 60 *l.* 16 *s.*

```
      20
     ----
      06
     121
     ----
     1216
       12
     ----
     2432
    1216
    -----
    14592

 3 s. 4 d.
 12
 ----
 40)  14592  (364 Ells 4/5.
      120
      ---
       259
       240
       ---
        192
        160
        ---
         32
```

Two

Two Merchants barter, *A* hath 432 Yards of Canvas at 14*d. per* Yard, *B* giveth *A* in barter for those 432 Yards of Canvas at 14 *d.* 24 pieces of Cloth. I desire to know how much *A* giveth for one piece of Cloth.

By the Rule of Three.

If 1 yard cost 14*d.* what will 432 yards?

```
                          14
                       ------
                        1728
                        432
                       ------
                12)  6048 (50|4 (25:4
                     60··   25
                    ------
                      48
                      48
```

If 24 pieces cost 25 *l.* 4 *s.* what cost 1?

```
             20
           ------
     24)   504   (21 s.
           48·
          ------
            24
            24
          ------
             0
```

Here

Here I find by the Operation *A* giveth 21 *s.* a piece for the 24 pieces of Cloth, as was required.

Two Merchants, *viz.* *A* and *B* do barter one with another, *A* hath Nutmegs at 5 *s.* *per* pound to ſell for ready money, but in barter he will ſell for 6 *s.* *per* pound, and *B* hath Cinnamon at 4 *s.* 6 *d.* *per* pound, to ſell for ready mony. I deſire to know how much *B* muſt ſell his Cinnamon a pound for in Barter that he may not be a loſer.

By the Rule of Three.

If 5 *s.* give 6 *s.* what will 4 *s.* 6 *d*? Anſwer 5 *s.* 4 *d.* $\frac{2}{3}$.

Two Merchants, *viz.* *A* and *B* do barter one with another. *A* hath Currans at 35 *s.* *per* Hundred, ready money, which he barters to *B* at 42 *s.* *per* Hundred : *B* hath Raiſins of the Sun, which coſt him 28 Shillings *per* Hundred, but he barters them at 33 Shillings 3 Pence *per* Hundred, I deſire to know how much in 100 *l.* each man gaineth ?

By

By the Rule of Three

If 35 *s.* gain 7 *s.* what will 100 *l.* gain? Anſwer 20 *l.*

If 28 *s.* gain 33 *s.* 3 *d.* what will 100 *l.* gain? Anſwer 18 *l.* 15 *s.*

By multiplying and dividing you will find,

A gaineth 20 *l. per Cent.*
B gaineth 18 *l.* 15 *s. per Cent.*

CHAP. XXVI.

Of Loſs and Gain.

THis Rule ſheweth how to find out the Loſs or Gains upon any parcel of Goods ſold, and it likewiſe ſheweth how to find what price you muſt ſell your Goods for to gain ſo much *per Cent.*

Queſt. 1. Suppoſe I buy broad Cloth at 7 *s.* 6 *d. per* Yard, and I ſell the ſame Cloth at 8 *s.* 9 *d. per* Yard, I deſire to know how much is gained in 100 *l.*

First

First see whether there be Gain or Loss in one Yard, and how much it is.

	s.	d.
Sold for *per* Yard	8	9
Given *per* Yard	7	6
Gained *per* Yard	1	3

By the Rule of Three say,

If 7 *s.* 6 *d.* gain 1 *s.* 3 *d.* what will 100 *l.* gain? Answer 16*l.* 13*s.* 4*d.* Multiply and divide, and you will find 16 *l.* 13 *s.* 4 *d.* is gained *per* 100*l.* the answer to the question, as was required.

Quest. 2. If one Yard of Broad Cloth be worth 9*s.*6*d.* for how much must 36 Yards be sold for to gain 20 *per Cent.*

By the Rule of Three say,

If 100 *l.* give 120 *l.* what will 9 *s.* 6 *d.* give? Answer 11 *s.* 4*d.* $\frac{8}{10}$. Multiply and divide, and you will find 11*s.* 4*d.* $\frac{8}{10}$. Then by the same Rule again say,

If 1 Yard give 11:4:$\frac{8}{10}$, what will 36 Yards? 20:10:4:$\frac{8}{8}$. Multiply and divide, and

and you will find that you muſt ſell 36 Yards of that Broad Cloth for 20:10:4:$\frac{8}{10}$ to gain 20*l. per Cent.*

Queſt. 3. If a piece of Broad Cloth containing 34 Yards coſt 18 *l.* 14 *s.* and I ſell it for 10 *s.* 8 *d. per* Yard, I demand whether I gain or loſe, and how much *per Cent.*

By the Rule of Three ſay,

If 1 Yard give 10 *s.* 8 *d.* what will 34 Yards? Anſw. 18 *l.* 2 *s.* 8 *d.* which is leſs than the price it coſt by 11 *s.* 4 *d.* therefore you have loſt, now to find how much you you have loſt *per Cent.* ſay,

If 18 *l.* 14 *s.* loſe 11 *s.* 4 *d.* what will 100 *l.* loſe? 3 *l.* 0 *s.* 7 *d.* $\frac{1}{4}$.

By multiplying and dividing you will find you loſe 3 *l.* 0*s.* 7*d.* $\frac{1}{4}$ in the 100 *l.* the anſwer to the queſtion, as was required.

Queſt. 4. If one Yard of Broad Cloth coſt me 13 *s.* 4 *d.* and I ſell 24 Yards of the ſame Cloth for 14*l.* 17*s.*6*d.* I deſire to know whether I gain or loſe, and how much in the 100 *l.* of mony.

By

By the Rule of Three say

If 1 Yard cost 13 *s.* 4 *d.* what will 24 Yards? Answer 16 *l.* 0 *s.* 0 *d.*

By multiplying and dividing I find 24 Yards at 13 *s.* 4 *d.* will cost 16 *l.* and I sold the 24 Yards for 14 *l.* 17 *s.* 6 *d.* So by *Subtraction* I find I have lost upon the 24 Yards 1 *l.* 2 *s.* 6 *d.* Now to know how much *per Cent.* say,

If 16 *l.* lose 1 *l.* 2 *s.* 6 *d.* what will 100 *l*? Answer 7 *l.* 0 *s.* 7 *d.* $\frac{1}{2}$.

By multiplying and dividing you will find you have lost 7 *l.* 0 *s.* 7 *d.* $\frac{1}{2}$ *per Cent.* the answer to the question as was required.

Quest. 5. If I give for 32 Yards of Cloth after the rate of 7 *s.* 6 *d.* and for 18 Yards 12 *s.* 6 *d.* and I sell one Yard with another for 10 *s. per* Yard. I desire to know whether I gain or lose, and how much *per Cent.*

By

By the Rule of Three ſay,

If 1 Yard coſt 7 *s.* 6 *d.* what coſt 32 Yards? Anſwer	12 0 0
If 1 Yard coſt 12 : 6, what coſt 18 Yards? Anſwer	11 5 0
50	23 5 0

So I find the two pieces contain 50 Yards and coſt me 23 *l.* 5 *s.* 0 *d.* but I ſell them round for 10 *s.* *per* Yard, and by the Rule of Three ſay,

If 1 Yard ſell for 10 *s.* what will 50 Yards ſell for? Anſwer 25 *l.*

By multiplying and dividing you will find it to amount unto 25 *l.* ſo that I have gained 1 *l.* 15 *s.* Now to know how much *per Cent.* I have gained,

By the Rule of Three ſay,

If 23 *l.* 5 *s.* gain 1 *l.* 15 *s.* what will 100 *l.* gain? Anſwer 7 *l.* 10 *s.* 6 *d.* $\frac{1}{4}$.

Multiply and divide, and you will find you have gained 7:10:6:$\frac{1}{4}$ in 100 *l.* which is the anſwer to the queſtion, as was required.

Queſt.

By the Rule of Three say

If 1 Yard cost 13 *s.* 4*d.* what will 24 Yards? Answer 16 *l.* 0 *s.* 0 *d.*

By multiplying and dividing I find 24 Yards at 13 *s.* 4*d.* will cost 16 *l.* and I sold the 24 Yards for 14 *l.* 17 *s.* 6*d.* So by *Subtraction* I find I have lost upon the 24 Yards 1 *l.* 2 *s.* 6 *d.* Now to know how much *per Cent.* say,

If 16 *l.* lose 1 *l.* 2 *s.* 6 *d.* what will 100*l*? Answer 7 *l.* 0 *s.* 7 *d.* $\frac{1}{2}$.

By multiplying and dividing you will find you have lost 7*l.* 0*s.* 7*d.* $\frac{1}{2}$ *per Cent.* the answer to the question as was required.

Quest. 5. If I give for 32 Yards of Cloth after the rate of 7 *s.* 6 *d.* and for 18 Yards 12 *s.* 6 *d.* and I sell one Yard with another for 10 *s.* *per* Yard. I desire to know whether I gain or lose, and how much *per Cent.*

By

By the Rule of Three say,

If 1 Yard cost 7 *s.* 6 *d.* what cost 32 Yards? Answer	12 0 0
If 1 Yard cost 12 : 6, what cost 18 Yards? Answer	11 5 0
50	23 5 0

So I find the two pieces contain 50 Yards and cost me 23 *l.* 5 *s.* 0 *d.* but I sell them round for 10 *s.* *per* Yard, and by the Rule of Three say,

If 1 Yard sell for 10 *s.* what will 50 Yards sell for ? Answer 25 *l.*

By multiplying and dividing you will find it to amount unto 25 *l.* so that I have gained 1 *l.* 15 *s.* Now to know how much *per Cent.* I have gained,

By the Rule of Three say,

If 23 *l.* 5 *s.* gain 1 *l.* 15 *s.* what will 100 *l.* gain ? Answer 7 *l.* 10 *s.* 6 *d.* $\frac{1}{4}$.

Multiply and divide, and you will find you have gained 7:10:6:$\frac{1}{4}$ in 100 *l.* which is the answer to the question, as was required.

Quest.

Quest. 6. If I buy 100 of Oranges at 2 a Penny, and another at 3 a penny, and ſell them 5 for two pence, I require to know how much is loſt or gained ?

By the Rule of Three ſay,

If 2 Or.coſt 1 *d.*what coſt	100,	Anſ.4:	2
If 3 Or.coſt 1 *d.*what coſt	100,	Anſ.2:	$9\frac{1}{3}$
5	200		$6:11\frac{1}{3}$

If 5 Oranges coſt 2 *d.* what coſt 200 ? Anſwer 80 *d.* or 6 *s.* 8 *d.*

So I find by multiplying and dividing the ſeveral Operations, that there is 3 *d.* $\frac{1}{3}$ of a penny loſt, being the anſwer to the queſtion, as was required.

CHAP.

CHAP. XXVII.

Allegation Medial.

TEacheth how to find out a Common or Medium Rate or Price in a mixture of ſeveral Rates and Prizes together, which muſt be performed by reducing the ſeveral prices into one Denomination.

Multiply the particulars of the ſeveral mixtures by his reſpective price, and divide their Sum by the whole quantity, the Quotient is the Medium or Common Price required.

Queſt. 1. A Cooper hath Wine of ſeveral prices. *Viz.* 36 Gallons at 2 *s.* 40 Gallons at 2 *s.* 6 *d.* 60 Gallons at 3 *s.* and 120 Gallons at 3 *s.* 4 *d.* He intends to put all theſe Wines together, but would know the common price.

In the following Work you have 36 Gallons multiplied by 24 pence, which is 2 *s.* the Product is 864 Pence. 40 Gallons by 30 Pence, or 2 *s.* 6 *d.* the Product thereof is

is 1200 Pence. 60 Gallons by 36 Pence or 3 *s.* the Product thereof is 2160 Pence. And 120 Gallons by 40 pence or 3 *s.* 4 *d.* the Product thereof is 4800; the Sum of these several Products is 9024, which if you divide by 250 Gallons the Sum of the several quantities, the Quotient will be 36 *d.* $\frac{24}{250}$ or 3 *s.* 0 *d.* $\frac{24}{250}$, which is the Medium or common Price, as was required.

Gall.		*s.*	*d.*	*d.*
36	multiplied by	2	or 24	is 864
40	multiplied by	2:6	or 30	is 1200
60	multiplied by	3	or 36	is 2160
120	multiplied by	3:4	or 40	is 4800
250				

250) 9024 (36 : $\frac{24}{250}$ *d.*
750
1524
1500
24
250

Quest. 2. A Mealman hath 230 Bushels of Meal at 9 *d.* 368 Bushels at 14 *d.* and

485

485 Bushels at 16 *d.* He is intended to mix all these together, and desires to know the common price.

Bushels.

230 multiplied by 9 *d.* is 2070
368 multiplied by 14 *d.* is 5152
485 multiplied by 16 *d.* is 7760

	d.
1083	14982(13 $\frac{903}{1085}$
	1083
	4152
	3249
	903
	1085

The common price here found out is 13 *d.* $\frac{3}{4}$, as was required, and in like manner for all other questions of this nature.

P CHAP.

CHAP. XXVIII.

Alligation Alternate.

ALligation *Alternate* teacheth how to mix divers ſorts and prices together, in ſuch manner that you may make them of what price or quantity you pleaſe.

Queſt. 1. A Goldſmith hath four ſorts of Gold, the firſt ſort is worth 36 Crowns the pound weight, the ſecond ſort is worth 38 Crowns the pound, the third ſort is worth 42 Crowns the pound, and the fourth ſort is worth 45 Crowns the pound: and with theſe it is required to make a mixture, worth 41 Crowns the pound. I deſire to know how much of each ſort he muſt take.

Firſt, ſetdown the numbers of which the Alligation is to be made, one under the other, *viz.* 36, 38, 42 and 45, in ſuch order as you ſee in the following Example, and the common price unto which you would reduce them, to the left hand, which

in

in this Example is 41, then obſerve which of the four numbers before ſet down are greater than the common number 41, and which are leſs, and with a Semicircle link a greater and a leſſer number together, for two greater or two ſmaller numbers than the common number may not be coupled together.

$$41\left\{\begin{array}{lll}36 & & 4\\ 38 & & 1\\ 42 & & 3\\ 45 & & 5\end{array}\right.$$

After theſe numbers are according to the former directions linked or coupled together, next obſerve how much each of the leſſer numbers differeth from the common number 41, and ſet that difference againſt his reſpective number to which he is coupled; as here 36 differeth 5 from the common number 41, which I do not ſet down againſt 36 but againſt 45, the number to which he is coupled; ſo likewiſe 38 doth differ 3 from the common number 41, which I do not ſet againſt 38 but againſt 42 the number to which he is coupled: likewiſe you muſt obſerve how much each

of the greater numbers doth exceed the common number 41, as 42 doth exceed the common number 41 but 1, which I ſet againſt the number 38, to which he is coupled, and 45 doth exceed the common number 41 but 4, which I ſet againſt the number 36 to which he is coupled. The Sum of theſe differences which is 13 ſheweth the number of pounds the compoſition or mixture muſt weigh, and the ſeveral differences do ſhew how many pound of each ſort you muſt take. As 4 ſheweth you muſt take 4 pound of 36 Crowns fine, 1 pound of 38 Crowns fine, 3 pound of 42 Crowns, and 5 pound of 45 Crowns fine; each pound of this mixture containing 13 *l.* is worth 40 Crowns, as was deſired.

The Proof.

		Crowns.
4 *l.* of 36	Crowns fine is	144
1 *l.* of 38		38
3 *l.* of 42		126
5 *l.* of 45		225
		533
So likewiſe 13 *l.* of 41 Crowns		533

But

But ſuppoſe it were required to make a mixture of a certain weight as well as a certain fineneſs. As, let it be required to make a mixture of 8 pound weight of the ſeveral former fineneſſes, and to the former common price of 41 Crowns, how much muſt be taken of each ſort?

Then by the Rule of Three ſay, As the Sum of the ſeveral differences which is 13 is to the weight propounded 8 pound, ſo is each particular difference to the weight deſired, as followeth.

As 13 is to 8, ſo is 4 to $2\frac{6}{13}$.
As 13 is to 8, ſo is 1 to $\frac{8}{13}$.
As 13 is to 8, ſo is 3 to $1\frac{11}{13}$.
As 13 is to 8, ſo is 5 to $3\frac{1}{13}$.

8 *l.*

So there muſt be 2 *l.* $\frac{6}{13}$ of the fineneſs of 36 Crowns, $\frac{8}{13}$ parts of a pound of 38 Crowns, 1 pound $\frac{11}{13}$ of 42 Crowns, and 3 pound $\frac{1}{13}$ of 45 Crowns, which added all together make 8.

To prove the Work.

$$\left.\begin{array}{l} 2\frac{6}{13} \text{ of } 36 \\ \;\;\frac{8}{13} \text{ of } 38 \\ 1\frac{11}{13} \text{ of } 42 \\ 3\frac{1}{13} \text{ of } 45 \end{array}\right\} \text{Crowns is} \left\{\begin{array}{r} 88\frac{8}{13} \\ 23\frac{5}{13} \\ 77\frac{7}{13} \\ 138\frac{6}{13} \end{array}\right.$$

$$\begin{array}{lr} & \overline{328} \\ \text{8 pound of 41 Crowns is} & 328 \end{array}$$

Therefore you may certainly conclude you have committed no error in your work.

Queſt. 2. A Vintner hath ſeveral ſorts of Wine, *viz.* he hath Wine of 14 *d.* the Gallon, Wine of 19*d.* the Gallon, Wine of 23*d.* the Gallon, and he hath Wine of 28*d.* the Gallon, now he doth intend to make a mixture of 48 Gallons; now it is required to know how many Gallons of each price he muſt take to make one Gallon with another worth 21 *d.*

	d.	*Gal.*			*s.*	*d.*
21	14	2	at	14	2	4
	19	7	at	19	11	1
	23	7	at	23	13	5
	28	2	at	28	4	8
		18	at	21	1:11	6

By

Say by the Rule of Three,

As 18 to 48, ſo 2 to 5 *Gallons* $\frac{6}{18}$
As 18 to 48, ſo 7 to 18 *Gallons* $\frac{1}{18}$
As 18 to 48, ſo 7 to 18 *Gallons* $\frac{12}{18}$
As 18 to 48, ſo 2 to 5 *Gallons* $\frac{6}{18}$

48

The Proof is as followeth.

$$\left.\begin{array}{r} 5\ \textit{Gallons}\ \frac{6}{18}\ \text{of}\ 14 \\ 18\ \textit{Gallons}\ \frac{12}{18}\ \text{of}\ 19 \\ 18\ \textit{Gallons}\ \frac{12}{18}\ \text{of}\ 23 \\ 5\ \textit{Gallons}\ \frac{6}{18}\ \text{of}\ 28 \end{array}\right\}\ \text{Pence is}\ \left\{\begin{array}{r} \textit{d.} \\ 74\ \frac{12}{18} \\ 354\ \frac{12}{18} \\ 429\ \frac{6}{18} \\ 149\ \frac{6}{18} \\ \hline 1008\ \textit{d.} \end{array}\right.$$

48 Gallons of 21 Pence is 1008 *d.*

Therefore you may conclude your Operation is without error.

Queſt. 3. A Drugſter hath three ſorts of Druggs, the firſt ſort at 3 *s.* the pound, the ſecond at 7 *s.* and the third at 15 *s. per* pound. Of theſe ſorts he is to make 3 parcels containing each 24 pound, one parcel to be reckoned 11 *s. per* pound, the other 12 *s.* and the other 13 *s.* how much muſt be taken of each ſort to make up each parcel?

$$11\left\{\begin{array}{l}3\\7\\15\end{array}\right.\begin{array}{l}4\\4\\8:4\\\hline 20\end{array}\quad 12\left\{\begin{array}{l}3\\7\\15\end{array}\right.\begin{array}{l}3\\3\\9:5\\\hline 20\end{array}\quad 13\left\{\begin{array}{l}3\\7\\15\end{array}\right.\begin{array}{l}2\\2\\10:6\\\hline 20\end{array}$$

The common prices propounded are 11 Shillings, 12 Shillings, and 13 Shillings; likewiſe the prices given of which the mixture is to be made are 3 Shillings, 7 Shillings and 15 Shillings, and becauſe two of the three given prices are leſs than the common price, I couple the two leſſer with the greater as you ſee, and the differences of the 2 leſſer I place againſt the greater, and the differences of the greater againſt the leſſer; then proceed as before, ſaying,

As 20 the whole difference is to 24 the whole quantity of each parcel, ſo is each particular difference to its reſpective quantity enquired after, as followeth.

$$1.\left\{\begin{array}{l}\text{As 20 to 24, ſo 4 to } 4\frac{4}{5}\\\text{As 20 to 24, ſo 4 to } 4\frac{4}{5}\\\text{As 20 to 24, ſo 12 to } 14\frac{2}{5}\end{array}\right.$$

$$\overline{24}$$

2. As

$$2.\left\{\begin{array}{l}\text{As } 20 \text{ to } 24,\ \text{so } 3 \text{ to } 3\frac{3}{5}\\ \text{As } 20 \text{ to } 24,\ \text{so } 3 \text{ to } 3\frac{3}{5}\\ \text{As } 20 \text{ to } 24,\ \text{so } 14 \text{ to } 16\frac{4}{5}\end{array}\right.$$

24

$$3.\left\{\begin{array}{l}\text{As } 20 \text{ to } 24,\ \text{so } 2 \text{ to } 2\frac{2}{5}\\ \text{As } 20 \text{ to } 24,\ \text{so } 2 \text{ to } 2\frac{2}{5}\\ \text{As } 20 \text{ to } 24,\ \text{so } 16 \text{ to } 19\frac{1}{5}\end{array}\right.$$

24

Here you see in the first parcel that is to be 11 *s. per* pound, to make a mixture of 24 *l.* you must take 4 pound $\frac{4}{5}$ of 3 *s. per* pound, 4 *l.* $\frac{4}{5}$ of 7 *s. per* pound, and 14 *l.* $\frac{2}{5}$ of 15 *s. per* pound; and in the second parcel of 12 *s.* the common price round, you must take 3 *l.* $\frac{3}{5}$ of 3 *s. per* pound, 3 *l.* $\frac{3}{5}$ of 7 *s. per* pound, and 16 *l.* $\frac{4}{5}$ of 15 *s. per* pound; and in the third parcel of 13 *s.* round, you must take 2 *l.* $\frac{2}{5}$ of 3 *s.* and 2 *l.* $\frac{2}{5}$ of 7 *s.* and 19 *l.* $\frac{1}{5}$ of 15 *s. per* pound, and if you add up each parcel found out they will each amount unto 24 *l.*

Quest. 4. A Goldsmith hath five sorts of Gold, one is 15 carrects fine, 17 carrects fine, 20 carrects fine, 23 carrects fine, and 26 carrects fine. All these five sorts he doth intend to mix with such an

allay, as that a mixture of 124 ounces ſhould be but 12 carrects fine, I deſire to know how much of either ſort of Gold muſt be taken to make up 124 *l*.

To anſwer this and all other queſtions of this nature, ſet down their ſeveral and particular fineneſſes one under another, as you ſee in the following Example, and ſet down the common fineneſs of the Gold which is demanded, *viz*. 12 carrects towards the left hand, alſo ſet down a Cypher under the particulars for an alloy, ſet the alloys difference, which is. 12, againſt all the other Sums, as in the Example you may ſee is done, and ſet the difference of all the other Sums againſt the alloy, as 3, 5, 8, 11 and 14. Then by the Rule of Three ſay, As 101 the whole difference is to 124 the whole quantity, ſo is each particular difference to each particular quantity ſought.

	15	12	12
	17	12	12
12	20	12	12
	23	15	12
	26	15	12
	0	3, 5, 8, 11, 14,	41
			101

As

								oz.
As	101	to	124,	ſo	12	to	14	$\frac{74}{101}$
As	101	to	124,	ſo	12	to	14	$\frac{74}{101}$
As	101	to	124,	ſo	12	to	14	$\frac{74}{101}$
As	101	to	124,	ſo	12	to	14	$\frac{74}{101}$
As	101	to	124,	ſo	12	to	14	$\frac{74}{101}$
As	101	to	124,	ſo	41	to	50	$\frac{34}{101}$
							124	

CHAP. XXIX.

Of Exchange.

EXchange is the way of remitting mony from one place or Country to another, by paying mony in one place, and receiving the like value in another, with allowance ſometimes of profit and ſometimes of loſs.

It will be of little or no conſequence to give you the names of the particular Coyns of ſeveral Countries, becauſe with us in *England* they ſometimes riſe and ſometimes fall in value, according as the Exchange runs, I therefore do only intend to lay down ſome neceſſary queſtions as follow.

Queſt.

Quest. 1. A Merchant payeth at *London*, or any other Sea Port Town of *England* 256 *l.* Sterling, to receive the value thereof at *Amsterdam* Exchange at 33*s*.9*d*. Flemish, for 20*s*. Sterling I desire to know how much Flemish mony I must receive at *Amsterdam*.

By the Rule of Three say,

If 1*l*. *Sterl.* give 33*s*.9*d*.Fl. what will 256*l*?

```
                  12
                 ----
                  75
                 33
                ----
                 405
                 256
     ------------------------
                2430
               2025
               810
     --------------------------
  12)   103680 (864(0  (432 l. Flem.
        96...   432
     ------------------------
         76
         72
     ------------------------
          48
          48
         ----
          00
```

Quest.

Quest. 2. A Merchant at *Amsterdam* doth deliver 432 *l.* Flemish, to receive the value thereof at *London* Exchange, 33 *s.* 9 *d.* for 20*s.* Sterling, I desire to know how much Sterling mony I must receive at *London* ?

By the Rule of Three say,

If 33*s.*9*d.*Fl.give 1*l.Ster.*what will 432*l.Fl.*

```
 12                                      20
-----                                 --------
 75                                    8640
 33                                      12
-----                                 --------
405) 103680 (256l. Sterl.              17280
      810..                            8640
     ------                           --------
      2268                            103680
      2025
     ------
       2430
       2430
      ------
          0
```

Multiply and divide and you will find he must receive 256 *l.* Sterling. These two questions do prove one another, as you may plainly see.

Quest.

Quest. 3. A Merchant at *London* delivers 374 *l.* 2 *s.* Sterling to be received in *Paris*, the like value Exchange at 58*d. per* French Crown. I demand how many French Crowns must I receive in *Paris* ?

By the Rule of Three say,

If 58 *d.* give 1 Fr. Cr. what will 374 *l.* 2 *s* ?

```
58) 89784 (1548 Fr. Cr.        20
    58..                      ----
    ----                      7482
    317                         12
    290                      -----
    ----                     14964
     278                     7482
     232                    ------
     ----                    89784
      464
      464
      ----
        0
```

By multiplying and dividing you will find you must receive at *Paris* 1548 French Crowns.

Quest. 4. A Merchant at *Paris* doth deliver 2870 French Crowns, the like value

to

to be received in *London*, Exchange at 57*d.* ½ *per* Crown. I desire to know how much Sterling mony I must receive at *London?*

By the Rule of Three say,

If 1 Fr.Cr. give 57*d.*½ how much will 2870

```
          4
        -----
         230
        2870
       ------
         000
       8610
      5740
      -------        12
4)    660100      (165025  (1375|2(
      4·····       12····     687
  ----------------------------------
      26            45
      24            36
  ----------------------------------
       20            90
       20            84
  ----------------------------------
        10            62
         8            60
  ----------------------------------
         20             25
         20             24
  ----------------------------------
          0              1
```

Facit 687 *l.* 12 *s.* 1 *d.*

Quest

*Quest.*5. A Merchant at *London* doth deliver for *Franckford* 140 *l.* Sterl. Exchange for *Frankford* at 46*d.*Sterl. the Florin of 66 Kreutrars. The Queſtion is how many Florins muſt he receive at 60 Kreutrars at *Frankford*?

By the Rule of Three ſay.

If 46*d.* give me 66 Kreutr. what will 140*l.*?

	20
46) 2217600 (48208	2800
184···· 44	12
377 48252 *Kreutr.*	5600
368	2800
96	33600
92	66
400	201600
368	201600
32	2217600

Florins.

60) 48252 (804 : 12 *Kreutrars.*
480·

252
240

Queſt.

Queſt. 6. An Merchant in *Antwerp* takes up mony by Exchange, at the rate of 33 *s.* 4 *d.* Flemiſh, to pay at *London* 20 *s.* Sterl. but when the Bill of Exchange came due, he was forced to take up mony in *London* to pay the ſaid Bill, to pay at *Antwerp* for every 20*s.* Sterling 33 *s.* 10 *d.* Flemiſh. I deſire to know whether I do win or loſe, and how much in the 100 *l.* of mony?

By the Rule of Three ſay.

If 33*s.*10*d.* give 33*s.*4*d.* what will 100*l*? Anſwer 98 *l.* 10*s.* 5*d.* which ſubtract from 100*l.* gives 1*l.* 9*s.* 7*d.* for the remainer, and ſo much is loſt in 100 *l.* of mony.

Queſt. 7. A Merchant at *Cales* doth receive a Bill of Exchange from *London* for 1500 Duckets which is the value of 365 *l.* 12 *s.* 6 *d.* Sterling delivered at *London.* I deſire to know what the Ducket is worth?

If 1500 Duckets coſt 365*l.* 12*s.* 6*d.* what coſt 1 Ducket? Anſwer 4 *l.* 10 *s.* $\frac{1}{2}$.

The Exchange between *London* and *France* is much different from the Flemiſh Exchange, becauſe in *France* it is delivered in French Crowns, which is worth 50 Sous Tournois the piece.

For

For in *France* they do account by Deniers Tournois, accounting 12 Deniers 1 Sous Tournois, and 20 Sous Tournois 1 Livre or Frank, which is alſo 1 Pound Tournois; the French Crown in Commerce is current for 51 Sous Tournois, but in Exchange it will paſs for no more than 50 Sous Tournois, which is 2 *l.* 10 Sous Tournois the Crown.

Queſt. 8. A Merchant in *London* doth deliver 360 *l.* 2 *s.* 4 *d.* Sterling Exchange at 5 *s.* 8 *d.* the French Crown, and to receive at *Paris* 50 Sous Tournois for every French Crown. I deſire to know how many Livres I ſhall receive at *Paris* for the 360 Pound paid in *London*?

By the Rule of Three ſay,

If 5 *s.* 8 *d.* give 2 Livres 10 Sous, what will 360 *l.* give? Multiply and divide and you will find 3177 Livres 10 Sous Tournois, and ſo much muſt I receive in *Paris* for my 360 Pound.

Queſt. 9. A Merchant at *Paris* doth deliver by Exchange 3784 Livres Tournois, at 50 Sous Tournois the French Crown, and for each French Crown to receive here

5 *s.*

5 *s.* 7 *d.* Sterling in *London*. I desire to know how much Sterling mony I shall receive for my 3784 Livres or Pounds Tournois ?

By the Rule of Three say,

If 2*l.* 10 Sous Tournois give 5*s* 7*d.* what will 3784 ? *Or*, If 5 *l.* Tournois give 10*s.* 2 *d.* Sterling, what will 3784 ?

Multiply and divide either of these proportions, and you will find the fourth proportional to be 422*l.* 10*s.* 11*d.* and so much you must receive at *London* for your 3784 Livres paid or delivered in Exchange at the rate before mentioned.

CHAP. XXX.

Of Gauging.

IF you would know how many Gallons any Vessel contains in Wine or Ale measure, you must first take the Diameter of the head of the said Vessel in Inches, then the Diameter at the Bung withinside in Inches,

Inches, then in the reſpective following Table look for the Diameter of the Bung in Inches before taken, which you will find in the reſpective Table in the Column intituled Inches, and the number that you find ſtand againſt it ſet down twice, then in the ſame Columns intituled Inches look for the Diameter of the head Inches, and the number ſtanding againſt it ſet down once under the number twice ſet down, and add them all together, multiply their Sum by the length of the Veſſel in Inches, from the Product cut off 3 figures towards the right hand, and thoſe remaining figures towards the left hand are the number of Gallons required, and the 3 figures cut off are parts of a Gallon either of Ale or Wine meaſure, according to the Table from whence you take your numbers.

Example 1.

There is a Cask or Veſſel whoſe Diameter at the Bung is 26 Inches, the Diameter at the head is 17 Inches, and the length of the ſaid Veſſel is 41 Inches. I deſire to know how many Gallons of Wine he doth contain? In the Wine Table over againſt 26 Inches

Inches the Diameter at the Bung, I find the number 0:766, which according to instructions I set down twice; likewise against the number 17 I find 328, which I set down: the Sum of all these three is 1:860, which multiplied by 41 the length, the Product is 76:260, from whence I cut off the three figures towards the right hand, and there will remain 76, which sheweth the Vessel doth contain 76 Gallons $\frac{260}{1000}$.

Diameter at Bung	26	0	766
The same		0	766
Diameter at Head	17	0	328
		1	860
			41
		1	860
		74	40
Content in Gallons		76	$\frac{260}{1000}$

Example 2.

There is a Cask or Vessel whose Diameter at Bung is 22 Inches, his Diameter at Head 16 Inches, and his Length 36 Inches. I do desire

desire to know how many Gallons of Ale measure it doth contain? out of the respective Table for Ale measure I find the Diameter at the Bung 22 Inches, and against it this number 450, which I set down twice, I also find out the Diameter at head 16 Inches in the same Table, and against it I find the number 238, which I set down as you see. Add all these together and their Sum will be 1138, which multiply by 36, the length of the Cask or Vessel, the Product will be 40:968, and cutting off three figures towards the right hand, there remains 40, which sheweth the Cask doth contain of Ale measure 40 Gallons $\frac{968}{1000}$.

Diameter at Bung	22	0	450
The same again		0	450
Diameter at Head	16	0	238
		1	138
			36
		6	828
		34	14
Content in Gallons		40	$\frac{968}{1000}$

A

A Table shewing how to find the Content of any Cask or Vessels in Gallons, &c.

Inc	Ale		Inc	measure		Inc	Wine		Inc	measure	
1	0	001	31	0	892	1	0	001	31	1	089
2	0	004	32	0	951	2	0	005	32	1	160
3	0	008	33	1	011	3	0	010	33	1	234
4	0	015	34	1	073	4	0	016	34	1	310
5	0	023	35	1	137	5	0	028	35	1	388
6	0	032	36	1	203	6	0	041	36	1	469
7	0	045	37	1	271	7	0	056	37	1	551
8	0	059	38	1	341	8	0	072	38	1	636
9	0	075	39	1	412	9	0	092	39	1	724
10	0	093	40	1	485	10	0	113	40	1	813
11	0	112	41	1	561	11	0	137	41	1	904
12	0	134	42	1	638	12	0	163	42	2	000
13	0	157	43	1	717	13	0	192	43	2	096
14	0	182	44	1	797	14	0	221	44	2	194
15	0	208	45	1	880	15	0	255	45	2	295
16	0	238	46	1	965	16	0	296	46	2	398
17	0	264	47	2	051	17	0	328	47	2	504
18	0	301	48	2	139	18	0	367	48	2	611
19	0	335	49	2	219	19	0	409	49	2	721
20	0	371	50	2	321	20	0	453	50	2	833
21	0	409	51	2	415	21	0	500	51	2	948
22	0	450	52	2	510	22	0	548	52	3	065
23	0	491	53	2	608	23	0	600	53	3	184
24	0	535	54	2	707	24	0	653	54	3	305
25	0	580	55	2	808	25	0	708	55	3	428
26	0	628	56	2	911	26	0	766	56	3	554
27	0	677	57	3	016	27	0	826	57	3	682
28	0	728	58	3	123	28	0	888	58	3	813
29	0	781	59	3	232	29	0	933	59	3	945
30	0	836	60	3	341	30	1	020	60	4	080

CHAP. XXXI.

The Extraction of the Square Root.

IT is neceſſary to inſert the Table of the Squares of all the nine Digits, as followeth.

Roots.	*Squares.*
1	1
2	4
3	9
4	16
5	25
6	36
7	49
8	64
9	81

Example.

It is required to extract the ſquare Root of 22429696, ſet a mark or prick with your Pen, under the firſt figure towards your right hand, and ſo under every ſecond figure as you ſee, ſo will your given number

ber be divided into four parts or points, whereby you must note that the Root will admit of four figures; for the square Root of the given number doth always admit of as many figures as the given number doth admit Points. Then proceed to the Extraction thus, beginning at the left hand the first Point being 22, by the former Table of Squares, I find 16 to be the greatest Square number contained therein, whose Square Root is 4, therefore I set down 4 in the Quotient, and the Square thereof 16 I set underneath 22, and I subtract one from the other and there remains 6, which I set underneath; to this remainer 6 I draw down the next Point 42, which doth make the number 642; next I double the Quotient 4 which is 8, which I set down one figure short of the right hand as you see; then do I seek how many times 8 will go in 64, which is 7 times, set down 7 under that vacant figure towards your right hand 2, and likewise set down 7 in the Quotient, and multiply 87 by 7, whose Product 609 set under the line, and subtract it from the number made of the last remainer, and the Point last brought down 642, and the remainer of this subtraction will be 33, to

which remainer draw down the next point 96, and it makes the number 3396; next double the Quotient 47, it makes 94, which set under the number 3396, that it may stand one figure short towards the right hand, as you see in the following Example; then ask how many times 94 is contained in the number or figures standing over them 339? answer is three times, therefore I set down 3 to the right hand of 94, also I set down 3 in the Quotient, then do I multiply 943 by 3 the last figure in the Quotient, and the Product of the multiplication 2829 I set underneath the line, and subtract it from the number made of the last remainer, and the point last brought down which is 3396, and of this subtraction there doth remain 567; lastly to this remainer I draw down the next point 96, and it makes the number 56796, now double the Quotient 473, which makes 946, and set it under the number 56796, that it stand one figure short towards your right hand as you see, and ask how many times 946 is contained in the figures standing over him 5679? answer is 6 times, setting down 6 to the right hand of 946, and also in the Quotient, and multiply 9466 by

6

6 the laſt figure ſet in the Quotient, and the Product of ſuch multiplication I ſet down under the line being 56796, which I ſubtract from the number compoſed of the laſt remainer, and laſt point brought down which is 56796, and there will remain 0, and having no more points to draw down, I therefore conclude I have finiſhed my Extraction, wherefore the ſquare Root of the given number 22429696 is 4736, as was required, as by the following Example doth appear.

```
22429696  (4736
16 · · ·
--------
 642
  87
--------
 609
  3396
   943
--------
  2829
   56796
    9466
--------
   56796
   00000
```

The Proof of the Extraction of the Square Root, is done by multiplying the Root found in it self, and the Product is the number given whose Square Root is required.

Example.

Let it be required to prove this Example where the Root found is 4736; therefore I multiply 4736 by it self, that is to say, by 4736, and the Product is 22429696 the number given.

```
    4736
    4736
   -----
   28416
  14208
 33152
18944
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22429696
```

CHAP.

CHAP. XXXII.

The Extraction of the Cube Root.

I Shall first insert a Table containing the Cubes of all the nine Digits, which I would advise the learner to be compleatly able to remember without book.

Roots.	*Cubes.*
1	1
2	8
3	27
4	64
5	125
6	216
7	343
8	512
9	729

Example.

Let it be required to extract the Cube Root of the given number 42144192.

 First

First point the given nuuiber as you ſee, ſetting a prick under the firſt figure towards your right hand, and ſo under every third figure as you ſee, every prick except the laſt towards the left hand containing three figures, and that containeth the two figures 42 : therefore in the foregoing Table, find out the greateſt Cube number in 42, which I find to be 27, whoſe Cube Root is 3, which place in the Quotient, and ſubtract the Cube number 27 from 42, and there will remain 15, which place underneath; to this remainer bring down the next point 144, ſo have you the number 15144, which call your Reſolv. draw a line under; ſquare the Quotient 3 which is 9, multiply the ſaid Spuare 9 by 300, and the Product thereof 2700, place under the Reſolvend, and call it the Treble Square. Again, multiply the Quotient 3 by 30, which makes 90, place 90 under the Treble Square, and call it the Treble Quotient, add the Treble Square and Treble Quotient together into one Sum, and it makes 2790, which call your Diviſor, then examine how often you can take your Diviſor in your Reſolvend, which is four times, ſet 4 in the Quotient, then multiply the Treble Square

Square 2700 by the 4 laſt placed in the Quotient, and ſubſcribe the Product underneath your Diviſor, ſquare the laſt ſaid figure in the Quotient 4, which is 16, thereby multiply the Treble Quotient 90, and the Product thereof 1440 place under the laſt Product 10800, cube the figure 4 laſt placed in the Quotient, which by the foregoing Table is 64, and place it under the preceding Products, then add theſe three Products into one Sum, and ſubtract the Sum thereof 12304 from your Reſolv. and there will remain 2840, to this remainder draw down the next point 192, and the number 2840192 is a new Reſolvend, under which draw a line, then ſquare the Quotient 34 which is 1156, which Square multiply by 300, and the Product 346800 ſet under the Reſolvend, and call it the Treble Square as before; then multiply the Quotient 34 by 30, and the Product thereof 1020, ſet under the Treble Square, and call it the Treble Quotient, and the Sum of the Treble Square and Treble Quotient is 347820, which call your Diviſor, and examine how often you can take your laſt Diviſor in your laſt Reſolvend, which will be 8 times, therefore ſet 8 in the Quotient, multiply

multiply your last Treble Square by the last figure in your Quotient 8, the Product thereof 2774400 subscribe under your last Divisor, square the last figure in your Quotient 8, which is 64, by which multiply the last Treble Quotient, the Product 65280 set under the last Product, then cube the last figure of your Quotient 8, which by the foregoing Table you will find to be 512, which place under the preceding Products, and add all these three Products into one Sum, which makes 2840192, which if you subtract from your last Resolvend there will remain 0, and in such manner must you proceed by reiterating the work by squaring the Quotient, until all the figures are brought down.

But in this Example the work is finished, for there is no more figure to draw down, and 0 remains; so the Cube Root of 42144192 is 348, as was required.

42144192 (348

27

15144 *Resolvend.*

2700 *Treble Square.*

90 *Treble Quotient.*

2790

10800

1440

64

12304

2840192 *Resolvend.*

346800 *Treble Square.*

1020 *Treble Quotient.*

347820 *Divisor.*

2774400

65280

512

2840192

0000000

To

To prove the Extraction of the Cube Root.

Multiply the Cube Root found by it ſelf, then multiply tne Product of the multiplication by the Root found, and the Product of this ſecond multiplication is the given number whoſe Cube Root is required.

Example.

```
     348
     348
    ----
    2784
   1392
  1044
  ------
  121104
     348
  ------
  968832
 484416
363312
--------
42144192
```

It

It is required to prove this Example of the Extraction of the Cube Root, wherein the Cube Root found is 348, which multiply by 348, and the Product of the multiplication will be 121104, which multiplied again by 348 the Root found produceth the given number to be extracted 42144192, whereby it is concluded the Operation is right.

FINIS.